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VOLUME NO. 2

EXPLANATORY NOTES

OF

INCREASES, DECREASES, AND CHANGES IN LANGUAGE

IN THE BUDGET FOR THE

DEPARTMENT OF AGRICULTURE

FOR THE

FISCAL YEAR ENDING JUNE 30, 1938

AND OF

WORK DONE UNDER EACH OF THE APPROPRIATION ITEMS

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FOREST SERVICE

General Statement

In summary, the increases and decreases in the 1938 Budget for the Forest Service consist of:

Increases:	
General Administrative Expenses	$43,768
National Forest Administration	700,000
Forest and Range Research	183,909
Acquisition of Lands for State Forests	1,000,000
Receipt Funds	142,424
Total increases	2,070,101
Decreases:	
Cooperative Work, Forest Service (Trust Funds)	1,000,000
Plains Shelterbelt Project	170,000
Total decreases	1,170,000
Net increase	900,101

In the statement accompanying the estimates for fiscal year 1937 there were presented the fundamental needs of the situation with which the Forest Service must deal. The passing of another year serves to emphasize the urgency of these needs and to sharpen the realization that little can be done toward meeting them unless or until a materially stronger financial base is provided. The picture is essentially the same, however, as it was a year ago, and the following paragraphs largely reiterate what was said at that time.

Forest lands, with the national forests as a nucleus, continue to play a vital part in national recovery and to build toward permanent economic prosperity. Public recognition of this fact is increasingly clear; opportunities increasingly great.

The program of the Forest Service is thus definitely in the public interest. One-tenth of the land area of the United States is entrusted to its care in the national forests. One-third of all our lands is chiefly valuable for forest purposes. With respect to the privately-owned timber lands of the country, the Forest Service must maintain a position of aggressive leadership to the end that these lands may contribute permanently and most fully to a sound and stable economic and social structure. This is particularly true in those regions where large areas of private timber holdings are intermingled with or contiguous to national-forest timber and where special effort is urgently necessary to bring about sustained yield management over the entire working circles thus involved.

The protection and administration of the national forests are still woefully undermanned--the opportunities which they afford for constructive public service still largely undeveloped. The increase requested in this section of our budget constitutes only limited provision for new additions to the system and a step toward meeting some of the most urgent needs on the older national-forest units.

The investment in essential permanent improvements on the national forests has been increased rapidly during the past two years. Increased maintenance charges naturally result. And yet, to make these great properties fully accessible to protection and public use, the systems of roads, trails, telephone lines, and various other facilitating improvements must still be greatly extended. Three million of our people visited or passed through the national forests in 1917, and in 1937 that number will exceed fifty million; and many million of these come specifically to use and enjoy the forests, to draw upon them for rest, relaxation, health, and spiritual and mental well-being. These people must be protected and served in many ways. For example, without improved, protected, and supervised camping areas, this enormous visitation would quickly become a menace to public health and property.

In almost every phase of Forest Service work research is fundamental and vital. Particularly is this true since radical changes are inevitable in the ownership and handling of forest lands and in the manufacture and utilization of forest products. And because so little forest research is being done by States and by private owners, and only a small amount is handled by other Federal bureaus or agencies, provision for it -- in such measure as will fill some of the gaps which exist because all forest research effort in the United States is so comparatively recent -- must be made by the Forest Service.

Uncontrolled exploitation on forest lands in private ownership is still creating ghost towns and rural slums. Some 170 million acres of forest are still without any substantial protection against fire. Four-fifths of our most valuable commercial land is still in notoriously unstable private ownership. The drain upon such lands exceeds normal forest growth in serious measure. A continuing, large-scale program of public land acquisition is a vitally necessary corrective.

FOREST SERVICE

(a) SALARIES AND EXPENSES, FOREST SERVICE

Changes in Language

A change is recommended in the preamble of the Forest Service section of the Appropriation Act which will permit the construction of buildings at a maximum cost of $7,500 instead of $5,000, as carried by the 1937 Act. A corresponding change is made in the proviso relating to the betterment of buildings which have reached authorized limits of cost. A third change relating to the measures which are authorized in preventing soil erosion has also been included.

Under existing and past building limitations, it has never been possible for the Forest Service to build for its employees, who are required to establish and maintain residences in Government-owned quarters, structures of the size and type necessary to provide adequate standards of comfort and convenience. It has been possible to construct such buildings as have been provided and keep within the established building limitations

only by drawing heavily upon contributed time of regular employees who are now fully engaged upon regular productive work and who cannot be used in building construction. In addition, labor, materials, and other costs of construction are steadily rising. The $7,500 limitation now requested will permit of no extravagance but will simply make it possible for the Forest Service to provide reasonably adequate official residence quarters where necessary.

The additional language recommended in connection with the prevention of soil erosion, etc., is being inserted for the purpose of obviating difficulties which might arise over a narrow interpretation of the present language, despite the fact that ample authority exists under the item "National Forest Administration" for the construction of dams and other devices for protection of national-forest properties.

(b) GENERAL ADMINISTRATIVE EXPENSES

	Regular	Emergency	Total
Appropriation, 1937	$565,232	$88,267	$653,499
Allotted to "Salaries, Office of the Secretary" (salary of one telephone operator)	- 1,500	- - -	- 1,500
Total available, 1937	563,732	88,267	651,999
Budget Estimate, 1938	607,500	- - -	607,500
Net change	+43,768	-88,267	-44,499

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or Decrease
General administration and business service:				
Regular funds	$362,123(a)	$563,732	$607,500	+$43,768(1)
PWA lieu funds	341	- - -	- - -	- - -
PWA emergency	6,884	1,938	- - -	- 1,938
Emergency relief funds	158,951	86,329	- - -	-86,329
Unobligated balance (regular funds)	2,177	- - -	- - -	- - -
Total (all funds)	530,476	651,999	607,500	-44,499

(a) Includes $7,500 transferred from appropriation for National Forest Reservation Commission; excludes $1,500 allotted to "Salaries, Office of the Secretary" for salary of telephone operator, carried forward as a transfer in 1938 Estimates.

INCREASE, REGULAR FUNDS

(1) An increase of $43,768 in regular funds to strengthen the general administrative organization of the Forest Service and to place the central office on an adequate financial footing. The general administrative organization of the Forest Service in Washington is still seriously inadequate. While in Forest Service practice the executive functions in all phases of administration are highly decentralized, the success of this most desirable localization of action is largely dependent upon a strong central organization manned and equipped for effective policy formulation, leadership, correlation, planning, personnel training, and inspection and for the maintenance and development of the steadily increasing cooperative relationships with other governmental and private agencies centering in Washington.

To date it has been possible to put into effect only partially a thoroughgoing plan of reorganization, developed after careful study and approved by the Department. This plan must be made fully effective to avoid continued serious sacrifice of reasonably attainable progress toward solution of major forestry and forest-land use problems.

Upon the basis of fiscal year 1937 appropriations, the general administrative costs of the Forest Service in Washington are only 2.7 percent of the cost of the organization and work for which the Washington forces must provide leadership, general direction, and many essential facilitating services. The increase now requested in this item amounts to .21 percent of the total 1937 Forest Service appropriations or .2 percent of the total requested for the fiscal year 1938. With this increase, the Forest Service general overhead expense will compare more favorably with the similar necessary expenses of other governmental and private industrial organizations.

CHANGE IN LANGUAGE

Reference to the statutory authorization for the establishment of the National Forest Reservation Commission has been eliminated, as it is considered that the authorization for payment of the necessary expenses of the Commission, which is retained, is all that is necessary for the purpose of that part of this subappropriation which relates to the Commission.

WORK UNDER THIS APPROPRIATION

This appropriation is used for salaries and expenses of employees in the Washington office engaged on general administrative and service-wide technical activities pertaining to the management of the national forests and for general service activities.

(c) NATIONAL FOREST ADMINISTRATION

	Regular	Emergency	Total
Appropriation, 1937	$10,815,950	$7,204,317	$18,020,267
Budget Estimate, 1938	11,515,950	- - -	11,515,950
Net change	+ 700,000	-7,204,317	- 6,504,317

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or Decrease
1. Timber use:				
Regular funds	$773,690	$894,863	$1,004,863	+$110,000 (1)
PWA lieu funds	4,000	- - -	- - -	- - -
PWA emergency funds	3,068	- - -	- - -	- - -
ER funds	126,640	130,000	- - -	- 130,000
Total	907,398	1,024,863	1,004,863	- 20,000
2. Forest fire prevention and preparedness:				
Regular funds	2,264,814	3,142,318	3,372,318	+ 230,000 (2)
PWA lieu funds	5,367	- - -	- - -	- - -
ER funds	662,262	800,000	- - -	- 800,000
Total	2,932,443	3,942,318	3,372,318	- 570,000
3. Forest fire suppression:				
Regular funds	227,965	229,965	229,965	- - -
ER funds	95,291	150,000	- - -	- 150,000
Total	323,256	379,965	229,965	- 150,000
4. Protection against tree insects:				
Regular funds	123,803	149,883	149,883	- - -
PWA emergency	4,744	- - -	- - -	- - -
ER funds	149,623	150,000	- - -	- 150,000
Total	278,170	299,883	149,883	- 150,000
5. Control of blister rust and other tree diseases:				
Regular funds	179,961	361,674	401,674	+ 40,000 (3)
PWA emergency	19,486	- - -	- - -	- - -
ER funds	500,269	500,000	- - -	- 500,000
Total	699,716	861,674	401,674	- 460,000

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
6. Timber stand improvement:				
Regular funds.....	$230,863	$232,883	$232,883	- - -
PWA emergency.....	33,825	- - -	- - -	- - -
ER funds.....	336,543	350,000	- - -	-$350,000
Total.....	601,231	582,883	232,883	- 350,000
7. Reforestation and revegetation of denuded areas:				
Regular funds.....	210,941	212,781	212,781	- - -
PWA lieu funds.....	6,000	- - -	- - -	- - -
PWA emergency.....	7,313	- - -	- - -	- - -
ER funds.....	345,118	350,000	- - -	- 350,000
Total.....	569,372	562,781	212,781	- 350,000
8. Nurseries and planting stocks:				
Regular funds.....	333,787	336,707	336,707	- - -
PWA lieu funds.....	27,931	2,381	- - -	- 2,381
ER funds.....	134,988	140,000	- - -	- 140,000
Total.....	496,706	479,088	336,707	- 142,381
9. Grazing use:				
Regular funds.....	832,089	1,064,369	1,094,369	+ 30,000 (4)
PWA lieu funds.....	4,421	482	- - -	- 482
PWA emergency funds.....	1,528	- - -	- - -	- - -
ER funds.....	119,197	120,000	- - -	- 120,000
Total.....	957,235	1,184,851	1,094,369	- 90,482
10. Recreation and land use:				
Regular funds.....	377,891	456,191	496,191	+ 40,000 (5)
ER funds.....	269,714	300,000	- - -	- 300,000
Total.....	647,605	756,191	496,191	- 260,000
11. Land classification, settlement, and claims:				
Regular funds.....	89,169	89,949	89,949	- - -
PWA lieu funds.....	697	- - -	- - -	- - -
ER funds.....	14,386	15,000	- - -	- 15,000
Total.....	104,252	104,949	89,949	- 15,000
12. Acquisition of land by direct purchase:				
Regular funds.....	196,249	197,949	197,949	- - -
13. Acquisition of land by exchange:				
Regular funds.....	61,708	62,248	62,248	- - -
ER funds.....	20,556	20,000	- - -	- 20,000
Total.....	82,264	82,248	62,248	- 20,000

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
14. Fish and game protection:				
Regular funds.....	$189,823	$328,652	$328,652	- - -
ER funds.....	195,489	200,000	- - -	-$200,000
Total.....	385,312	528,652	328,652	- 200,000
15. Construction of truck and horse trails:				
Regular funds.....	348,562	351,492	351,492	- - -
16. Maintenance of truck and horse trails:				
Regular funds.....	160,100	161,500	161,500	- - -
17. Construction of other improvements:				
Regular funds.....	537,676	842,376	842,376	- - -
PWA emergency.....	104,259	8,319	- - -	- 8,319
ER funds.....	3,332,613	3,688,135	- - -	-3,688,135
Total.....	3,974.548	4,538,830	842,376	-3,696,454
18. Maintenance of other improvements:				
Regular funds.....	526,577	1,357,883	1,607,883	+ 250,000(6)
PWA lieu funds.....	33,990	- - -	- - -	- - -
PWA emergency.....	24,864	- - -	- - -	- - -
ER funds.....	508,924	200,000	- - -	- 200,000
Total.....	1,094,355	1,557,883	1,607,883	+ 50,000
19. General surveys and maps:				
Regular funds.....	191,449	218,119	218,119	- - -
PWA emergency.....	7,170	- - -	- - -	- - -
ER funds.....	84,869	80,000	- - -	- 80,000
Total.....	283,488	298,119	218,119	- 80,000
20. Equipment and stores:				
Regular funds.....	104,435	105,345	105,345	- - -
21. Cooperation with other departments, bureaus, and agencies:				
Regular funds.....	18,643	18,803	18,803	- - -
Total obligations:				
Regular funds.....	7,980,195	10,815,950	11,515,950	+700,000
PWA lieu funds.....	82,406	2,863	- - -	- 2,863
PWA emergency.....	206,257	8,319	- - -	- 8,319
ER funds.....	6,896,482	7,193,135	- - -	-7,193,135
Total.....	15,165,340	18,020,267	11,515,950	-6,504,317

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
Unobligated balance (regular funds).....	$119,382	- - -	- - -	- - -
Total, Regular funds.....	(a) 8,099,577	$10,815,950	$11,515,950	+$700,000(A)
" PWA lieu funds....	82,406	2,863	- - -	- 2,863
" PWA emergency.....	207,257	8,319	- - -	- 8,319
" ER funds.....	6,896,482	7,193,135	- - -	-7,193,135
Total, All funds....	15,285,722	18,020,267	11,515,950	-6,504,317

(a) Includes $100,000 provided by First Deficiency Appropriation Act, fiscal year, 1936; also excludes $10,000 allotted to Division of Disbursement, Treasury Department (to cover disbursing services), which was transferred in the estimates for 1937.

(A) The increase of $700,000 in regular funds for 1938 consists of:

(1) An increase of $110,000 for timber-sales work.--This increase will be more than offset by substantially greater receipts from the sale of forest products in the fiscal year 1938. The demand for national-forest timber is rising sharply as building activities climb steadily back toward a normal level. As new timber-sale operations are started and as old operations which have been dormant reopen, additional personnel are necessary both for sale preparation and for sale administration. An illustration is the rapid increase in timber business of the Southeastern Region, which with $469,100 timber-sale receipts for the fiscal year 1936 was exceeded only by Northwestern Region comprised of Washington and Oregon. Receipts from timber in the fiscal year 1936 increased $474,690, or 27 percent, over 1935. A further increase is assured in the fiscal year 1937. Because of the importance of this activity to dependent communities and industries, the Forest Service is making every effort to administer this expanding activity despite the fact that the increase allowed in the fiscal year 1937 was small in comparison with the expansion in this activity.

Experienced, trained employees are necessary for sale administration, for appraising timber before advertising the sales, and for supervising the timber survey or cruising work which must precede appraisal or sale. It is revenue-producing work which must be handled well in order to maintain the principle of sustained yield and the other requirements of laws governing the administration of the national forests.

The revival of the timber business makes it essential to resume timber surveys, which were sharply reduced during the depression period when cutting was light. These inventories of the timber resource are the basic data for planning, so that the sale of the timber may result in the greatest social and economic gains under sustained yield and give basic data for the valuation of the timber to be sold currently from specific areas. The timber-use job starts one or more years before a contract is made and continues through the life of the sale. As one sale is cut out a new one must have

been prepared to replace it if employment is to be continuous. The increase in the volume of national forest timber business, therefore, involves increase in the cost of planning for the best use of the resource, of cruising and appraising the timber, and of sale administration, but with an increasing net revenue.

(2) An increase of $230,000 for forest-fire prevention and preparedness. This increase is needed to provide protection to the additional acreage of national-forest land which will be purchased during the fiscal year 1937 and to strengthen protection on areas now under administration.

The increase allowed in the fiscal year 1937 will materially help in building up our fire-guard force, but the number should be still further increased and provision should be made for additional supervisory personnel and suppression squads, development and purchase of special fire-fighting equipment, further development of new techniques and their supporting equipment, and for carrying on a fire-prevention campaign designed to reduce the number of man-caused fires. Funds will be lacking in the fiscal year 1937 for all of the purposes listed in the preceding sentence.

The bulk of the fire-fighting equipment now owned and used is of the small hand tool type, very much the same as that used for many years past. There is imperative necessity to modernize and mechanize the forces of fire fighting. Much good work has been done in the field to develop, adapt, and create newer and better types of heavy equipment, but funds are insufficient to purchase such implements for adequate distribution to the forests. The use of water as a fire-fighting means lags far behind other methods because of our need of more pumps, engines, hose lines, tank trucks, man-pack units, pipe lines, and storage tanks.

The present motor-driven fire-line-building and trench-digging equipment (such as tractors, plows, bulldozers, and all brush-cutting and breaking accessories) is very limited in quantity. Radio equipment should be used on a much larger scale. The Forest Service owns no airplanes and these, with specially designed bodies, rigs, attachments and instruments are badly needed in connection with fire detection, for transportation of men and supplies to fires and for scouting, and for actual aerial fire attack. The plane for which authorization is included in the 1938 estimates will be used for experimental work in suppressing forest fires from the air. Chemicals have never been used, and processes now being developed through exhaustive experimentation will require a large amount of mixing, generating, and ejecting devices.

Fire prevention is a project of major importance. During the past 5 years the number of fires caused by careless smokers and campers has averaged 34 percent of the total number of fires occurring; and the average number due to incendiarism during the same period is 14 percent of the total number. Constant and powerful campaigns of education and warning must be conducted in and out of season to reduce the alarming number of man-caused fires. Every effort is being made by the field forces in direct contact with the public but this must be supplemented and fortified by many other means, such as posters, pamphlets, maps, sign boards, motion pictures, projectors, lectures, sound-film machines, "show-boat" trucks, etc. Much

more thorough and extensive surveys will be made of resident and transient populations to determine the character and extent of motives and to form the basis of the selection of the proper mediums in each case. The few law-enforcement specialists used in the past have had a marked preventive effect in these localities. The use of such specialists should be increased.

(3) An increase of $40,000 for protection against white-pine blister rust. The most important tree-killing disease on the national forests is the white-pine blister rust. This European disease is thoroughly established in the forests of western white pine in Idaho, western Montana, and Washington, and is moving southward through Oregon into the sugar-pine region of California; being actually discovered in this State for the first time during the past year. The western species of white pine are even more susceptible to this disease than is eastern white pine. Furthermore, in northern Idaho and the adjacent parts of Montana and Washington white pine is by far the most valuable tree in the forest, and the local communities are dependent for their very existence on its continued production. Sugar pine is California's most valuable species and has proven to be especially susceptible to the blister-rust disease. If blister rust is not controlled it will remove this most valuable tree from the California forests.

Blister rust has to spend part of its life-cycle in the leaves of currant or gooseberry bushes and can travel back to pine trees only for a distance of about 1,000 feet. The destruction of these bushes prevents infection of the pines. The work, therefore, consists of finding and uprooting the currant and gooseberry bushes in the immediate vicinity of white-pine stands or, where more economical, of killing these bushes with chemicals. Once an area has been worked over, maintenance is only a small fraction of the initial cost.

The work is very largely hand labor, with an average of 80 to 90 percent of the total expenditure used for the pay, subsistence, and transportation of men. In the northern Idaho-western Montana region, a little over half of the 1,400,000 acres of the white-pine type needing protection on national-forest lands has been covered. The work has been done in the closest cooperation with the Bureau of Entomology and Plant Quarantine, so as to make the activities of both bureaus most effective in its application to practicable units of both national-forest land and adjacent or intermingled lands in other ownerships. The continuance and completion of the job is urgent, and the funds requested are essential to cover areas which it has been impossible to reach from CCC camps or by the use of other emergency funds.

(4) An increase of $30,000 for grazing use work. Approximately 89,000,000 acres of national-forest range are utilized by some 13,000,000 head of domestic livestock owned by some 26,000 permittees. In addition, practically all the lands within the national forests are accessible to and are used by various forms of wildlife.

The use of the national forests by big game has to be carefully coordinated with the use of forage by domestic animals. The administrative activities connected with the handling of applications for grazing permits, issuance of permits, stock counting, inspection of ranges, supervision of

improvement construction and maintenance, contacting stockmen in connection with range matters, handling complaints, and appeals, preparing reports and management plans, preventing trespass, etc., occupy a large part of the administrative personnel's time.

Grazing surveys and plans must be handled largely by special crews. Such surveys are important and necessary to map and bring together the basic facts about the range, on which to evaluate the resource in terms of carrying capacity and class of use and to build progressive plans of management. About 50 million acres at present need to be covered by such surveys.

Both range administration and grazing surveys have fallen down in volume, due to the imperative claims on official time for other pressing work. Restoration of this time and more intensive supervision, and the collection of basic data through more intensive surveys, are imperative to prevent destructive grazing, control trespass, take care of and correlate recreational, fish, and game and other uses, and at the same time give better service to those dependent on livestock and the forest ranges for their livelihood. Unless tha attention once given to grazing is restored, a continuous and drastic reduction in numbers of stock permitted to graze, resulting in social and economic injustices, will be necessary. Better supervision would have prevented some of the reductions that were necessary due to protracted droughts and reduced standards of management during the past few years.

(5) An increase of $40,000 for recreation and land-use. The natural conditions, area, and distribution of the national forests throughout the country and the increase in automobile travel cause the forests to be used extensively by the public for all sorts of purposes. Originally created as sources of timber supply and for maintenance of conditions of stream flow, other uses have developed, including forage and wildlife production, soil conservation, and recreation. The correlation of these multiple uses is in accordance with established policy. Recreation use is increasing rapidly, and increased funds to provide for development and control of this use are essential.

The recreational use of the national forests is estimated to be 15 or 16 times what it was 20 years ago. Over 58,000,000 people visited or passed through the national forests in 1935. Recreation has become one of the leading industries in many of the States and has reached the point of development in Michigan and Wisconsin of being their second largest industry. Recreational use, so far as possible, is concentrated in localized areas where relatively simple provision goes far to meet the need of this very desirable use of the forest. Great hazard to public safety, health, and property is thus avoided.

In the national forests over 4,200 areas have been selected for campground purposes and approximately 3,700 acres are now in various states of development. A vital need is for the supervision and patrol policing of these campgrounds with caretakers adequate to keep them in sanitary and protective condition. Not only is the number of people increasing each year, but the average period spent by each visitor is also increasing; people stay longer on their vacations.

In addition to campground supervision this project includes the issuance of permits authorizing occupancy of national-forest lands for Boy Scout, outdoor school, and health camps, hotels, resorts, club houses, and individual summer homes or mountain cabins. This occupancy requires a degree of supervision in the interests not only of the permittees but the general public. Here again the use is increasing in numbers and in details of administration. The use as a continuing one depends upon regular rather than emergency allotments.

Recreation within national forests has a very definite effect upon the local communities. Many communities have lost their economic base, which was a sawmill, mine, or commercial fishing. Some have become ghost towns, others have been close enough to recreational developments so that new life has been given them through the dollars spent by the recreation visitors. Many of these communities have a greater stability now than was possible when the community was first established. This business is definitely on the increase. There is a constant shifting of our recreation seekers with each season of the year.

The preservation of high scenic recreational and natural values of the national forests, together with their increased use by the public for health, recreation, and inspirational features, calls for a careful and complete survey of their recreational resources and for more or less detailed plans. The management of the recreational activity, correlation of this activity with others, and classification of the lands for proper distribution as between different classes of use, including the preservation of natural resources and provision for the various forms of occupancy, make advance planning necessary. The making of such surveys and plans must be done by technically qualified personnel familiar with national-forest administration, including professional landscape architects, construction engineers, and recreational management experts. The organization and employment of specialized personnel for this work are matters of real urgency. They cannot be obtained under emergency allotments.

(6) An increase of $250,000 for the maintenance of improvements other than roads and trails. This increase is requested for the purpose of maintaining the buildings, telephone lines, fences, fire breaks, water-development projects, etc., with which the national forests are equipped. While the system of fire control, administrative, range, and recreational improvements on the national forests is not complete, large increases have been made in the varied forms of structure and plant required for the successful management of these resources, but this investment will have been useless unless provision is made for the simple maintenance required.

Protection of national-forest timber resources, including large areas which have been replanted, requires that before the beginning of each fire season telephone lines be gone over and put in working shape and the damage to structures repaired. Campgrounds must be cleaned up and put in usable shape and their fire-preventive safeguards freshly overhauled. Fences needed for prevention of trespass and for the control of range stock must be repaired annually if they are to serve the purposes for which they were constructed. If maintenance is not kept up, an enormous eventual bill for replacements must be met or the investment abandoned. Due to uncontroll-

able causes of yearly damage, such as breakage by snow, wind, and water and usual or normal breakage or damage by stock, the year-by-year efficiency of improvements is greatly impaired and the investment eventually lost unless annual repair is provided.

CHANGES IN LANGUAGE

Because of the difficulties which arise in making the distribution of the total appropriation to National Forest Regions far in advance of the beginning of the fiscal year, it is recommended that the regional subdivisions under the item "National Forest Administration" be eliminated from the 1938 appropriation language.

As an example of the difficulties which arise under present conditions, the adjustments which were necessary in the 1937 appropriation might be cited. At the time the 1937 estimates were prepared by the Forest Service, the increase requested for "Blister Rust Control and Other Tree Diseases" was based entirely upon the need for additional funds to combat the white-pine blister rust epidemic in Region 1. The estimates were submitted to the Budget Bureau on this basis. Shortly thereafter a twig-blight epidemic in National Forest Region No. 3 (Arizona and New Mexico) assumed serious proportions. At that time, it appeared that the twig-blight disease constituted a threat to all the ponderosa pine timber in the West. Accordingly, when the Budget was marked up for printing a large part of the increase which had been allowed for "Blister Rust Control and Other Tree Diseases" was allocated to Region 3. The Budget was considered on this basis by the committees of Congress and the final allocation of funds in the Appropriation Act included a substantial item for the control of the twig-blight epidemic in Region 3. However, by the time allotments to regions were made, shortly before the beginning of the fiscal year, the experts of the Bureau of Entomology and Plant Quarantine determined that the twig-blight epidemic might not be so serious as at first believed, and, in consequence, no increase for the control of tree diseases was allocated to Region 3, the entire increase for this activity going to Region 1. It then became necessary to obtain the Secretary's approval, under the 10 percent interchangeability proviso, of an increase above the amount shown in the Appropriation Act for Region 1 and a decrease for Region 3. In this instance, it was possible to take care of the situation under the 10 percent interchangeability clause, but situations could arise where such adjustments would be impracticable.

Another objection to the continuation of the present language is the necessity for Congressional Committees to consult with the Department in distributing the total appropriation to regions. This situation arises whenever the total appropriation is changed by a Congressional Committee. Ordinarily the committees are pressed for time and require an immediate distribution of the total appropriation. Varying totals in the appropriation inject special problems into the distribution task, and it is exceedingly difficult for the Department to make an intelligent decision as to the proper figures within the short space of time allowed, with the result that adjustment must later be made under the Secretary's authority to transfer amounts between subappropriations.

The foregoing amendment will make necessary the following additional changes in the language of this paragraph:

The words "use, maintenance, improvement" have been inserted in the second line of the item, as they were used in the closing paragraph of the 1937 item which referred to the regional distribution of the amounts appropriated.

The proviso authorizing the use of not to exceed $200 in caring for the graves of fire fighters, formerly carried in the item for National Forest Region 1, has been changed to provide for the expenses of proper care, without stating the amount. Expenditures for this item in the past have never been as much as $200 in one year, and it is not expected that they will increase. The change in language recommended will obviate the necessity for setting up a separate bookkeeping fund for this item.

Other changes in language, not caused by the elimination of the regional items, are discussed below:

The prohibition against the purchase of landing fields or aircraft has been changed to permit the purchase of one airplane in the fiscal year 1938. The Forest Service is able to contract for airplane service in connection with the operation of air patrols, for reconnaissance flights over large fires, and for the transportation of men and equipment to roadless areas. In recent years, however, the development of aircraft has been so rapid that serious consideration is being given to the use of such equipment in actually suppressing forest fires. In 1938 it is proposed to purchase one airplane and equip it with tanks and ejecting devices for depositing water or chemicals on going fires, in the hope of developing equipment and methods which will prove successful in suppressing fires from the air. This experimental work can not be effectively performed with rented planes because planes required for fire-suppression work must be permanently equipped with tanks and ejecting devices, which would render them unsuitable for other normal flying purposes.

The language pertaining to fire prevention and recreational facilities has been changed so as to authorize specifically their construction and maintenance. Existing language authorizing "the construction and maintenance of all other improvements necessary for the proper and economical administration, protection, development, and use of the national forests" might possibly be construed as applying only to administrative structures. In view of the growing importance of the recreational use of the national forests, it is felt that definite authority for equipping national-forest campgrounds adequately should be included in the language of this item.

WORK UNDER THIS APPROPRIATION

General.--This appropriation covers all field activities relating to the administration, protection, and development of the national forests except the special appropriations for the construction of roads and trails under the Federal Highway Act and the Act authorizing the expenditure of ten percent of national-forest receipts for this purpose; the acquisition of additional forest lands under the Act of March 1, 1911; emergency expenditures for fire suppression; and expenditures from funds deposited to the credit of the Forest Service by counties, States, associations, and individuals for fire prevention and suppression, brush disposal, construction and maintenance of improvements, and reforestation.

While the description of the work done under this appropriation appears under the specific work projects which follow, a large percentage of the personnel paid from this appropriation are unit managers of ranger districts, national forests, and national-forest regions who participate to varying degrees in all the projects listed in these estimates. The need for these men and their general assistants is determined by the composite job load on the unit administered.

1. Timber Use.--The Act of June 4, 1897 provides for the sale of timber from the national forests but also requires that a "continuous supply" be provided for. Thus sales are authorized on the sustained yield basis, with the forest treated as a renewing crop. In order to do this, definite knowledge of the volume, species, and condition of the stands is necessary, disposal must be planned carefully so as to keep the forest growing more timber, and the sale must be capably administered. Also the specific timber offered for sale is appraised by competent men to obtain a fair value for the Government's property.

Cruising, the preparation of long-time plans for sustained yield operations, the determination of and marking of trees that are to be cut, the appraisal of timber offered, and the enforcement of the conditions of the contract of sale, including the determination of the volume cut and consequently of the amount to be paid, are all necessary for the accomplishment of the job as outlined in the law governing sales of national-forest timber.

In addition to timber that is sold for commercial purposes, dead timber is also furnished free in limited amounts to bona fide settlers, miners, residents, and prospectors for minerals and for firewood, fencing, building, mining, prospecting, and domestic purposes. Green timber is furnished free where the cutting will benefit the timber stand. In addition, sales at cost of administration, under special legal provision, are made to homestead settlers and farmers for material needed for the farm.

2. Forest Fire Prevention and Preparedness.--Practically every employee paid from this appropriation contributes in some degree to this project. The Act of June 4, 1897 originally provided for the protection of the national forests from fire. Appropriations were small, however, and for years very little was done beyond the efforts of the permanent force of employees. The disastrous forest fire year of 1910 brought about

a recognition of the size of the problem, and the present system of organized fire control dates back to that year.

The fire-prevention activity is carried on by constant educational campaigns through the use of all available media--news items, radio programs, motion pictures, exhibits, lectures, admonitory signs, and distribution of pamphlets and other literature; and also by apprehending and prosecuting persons responsible for starting fires, by requiring visitors to equip themselves with fire-fighting tools, by the partial or entire closing of the national forests to public travel during dangerous periods, by "fire-proofing" campgrounds, by the concentration of campers on public campgrounds, by prohibiting smoking and camping at other than established campgrounds, by registering and cautioning tourists, and by clearing road rights-of-way.

The task of controlling forest fires is largely one of advance systematized preparation. As the fire-control problem is one of high priority, practically all the members of the permanent organization are available for fire duty. In addition, approximately 5,300 temporary men designated "guards" are employed during the fire season and are stationed at strategic points through the forests where they act as lookouts, "smoke-chasers", or patrolmen.

The lookouts are stationed at points which overlook large areas of forest land. These men are tied in by telephone to ranger district headquarters. They watch for fires and notify district rangers of the location of the fires. Smokechasers are stationed on roads or trails and are also tied in by telephone to ranger district headquarters, and when fires are reported the smokechasers are dispatched to the fire. Patrolmen both detect and suppress the fires which occur along their patrol routes.

Before the fire season opens complete plans are prepared, which include maps showing transportation and communication systems, areas visible from lookout stations, areas of greatest fire hazard, etc. Organization charts are also prepared showing the location of all available man-power, including permanent and temporary employees, road and other construction crews, settlers and ranchers, sawmill and logging camp operators, etc. Similar information is included for the tools, equipment, and food supplies which may be needed if large crews are required for suppressing fires. Cooperative agreements are entered into with all agencies in the vicinity of the national forest which may be of assistance in controlling forest fires. Men are selected and systematically trained at pre-season training camps whenever possible, and detailed written instructions are prepared for each member of the force.

3. Forest Fire Suppression.--Fire is an ever-present danger in forested areas. The great size of the forests in comparison with the relatively small patrolling force, the inaccessibility of wilderness areas, the dry air, light rainfall, the prevalence of lightning in the mountains, and the constant use of fire in the daily life of the people and in industries combines greatly to increase the hazard.

Complete fire exclusion in a forest is rarely attainable, because fires originate from natural as well as human causes. The established protection policy calls for fast, energetic, and thorough suppression of all fires in all locations during possibly dangerous fire weather. The objective demands such planning and execution of attack as will secure control within the first work period or before 10 o'clock of the next morning.

Upon receipt of the report of a fire, the regular organization functions immediately and men are dispatched to the scene. Though each fire-suppression job is an individual problem, there are certain basic principles of attack. The first requirement is usually to learn the size of the fire and determine its probable progress by noting topography, type of cover, wind conditions, dryness of litter, natural firebreaks, etc. Next comes the job of building the fire line where the best judgment of the officers in charge dictates. The line is patrolled to prevent the fire from jumping it. During the construction of the control line and after it has been completed and the fire checked, continual patrol is necessary to prevent it from breaking out again, jumping the line, and going on a rampage. No fire is left until it is completely out.

4. Protection Against Tree Insects.--Tree insects are always present in the natural forest. Under normal conditions they are kept in check by their natural enemies. Ever since the Forest Service has had jurisdiction over the national forests, close cooperative contacts have been had with the Bureau of Entomology and Plant Quarantine, the agency to which the Forest Service looks for its technical advice in the control of forest insects.

The purpose of insect control is to catch in the early stage infestations which are becoming epidemic, in an endeavor to prevent widespread infestations. Much of the timber in the national forests is overripe and is therefore more subject to insect attack than the thrifty faster-growing stands.

Insects are controlled in numerous ways, control procedure varying with the type of insect and its life cycle. Bark beetles, which are the cause of the greatest timber losses, are controlled by destroying the immature beetles before they leave the host tree, and this is usually accomplished by felling the trees and burning the logs, felling the trees and peeling and burning the bark, or by spraying with oil and scorching thoroughly the standing tree. Defoliating insects are controlled by spraying the foliage with poison.

5. Control of Blister Rusts and Other Tree Diseases.--As in the case of insects, disease is practically always present to some degree in the natural forest. External influences such as man, wind, and fire have greatly increased the hazards of the forest from tree diseases. In addition to the native species of fungi at work in our forests, there have been a number of very destructive fungi introduced from abroad. The most outstanding examples of such fungi are the chestnut blight, the Dutch elm disease, and the white-pine blister rust. The chestnut blight became so thoroughly established in our eastern forests before being discovered that

control proved to be impossible and as a result the American chestnut has almost entirely disappeared from our forests. The white-pine blister rust gave promise of repeating the history of the chestnut but adequate control measures have been developed and, if the finances can be provided, it is definitely known that white pine can be protected from this disease. The size of the job of protecting white pine from blister rust is pretty definitely known, and plans have been made which, if carried out, will insure the growing of white pine on its best natural sites.

The Forest Service looks to the Bureau of Plant Industry and the Bureau of Entomology and Plant Quarantine for its technical advice in the control of tree diseases. Very close cooperative relationships are being maintained with these bureaus. In the blister-rust control activity on national-forest lands the Bureau of Entomology and Plant Quarantine provides the technical direction and the Forest Service handles the control operations. On lands outside the national forests the Bureau of Entomology and Plant Quarantine directs both the control operations and technical supervision. It is important that the two bureaus keep their programs in proper balance because of the intermingling of private and national-forest lands. This has been accomplished very satisfactorily through the excellent cooperative arrangement which has existed between them.

The purpose of disease control is to catch in the early stages infestations which are becoming epidemic in an endeavor to prevent widespread infestations.

The treatment necessary to control a disease varies with the characteristics of that particular disease. Tree-rotting fungi are controlled by eliminating the infected host trees from the forest. A disease like the blister rust is controlled by eliminating the alternate host species--currants and gooseberries--from the vicinity of the pine. Since the spores from the infected pine can not directly infect other pines, but must first pass through a fruiting stage on the currants and gooseberries, the removal of these shrubs protects the pine from attack.

6. Timber Stand Improvement.--Timber-stand improvement represents a type of work highly essential if intensive forest management is to be practiced on our national-forest properties. Its object is to improve the conditions for growth in our various types of stands. Timberstand improvement is accomplished through practices known as cleaning, thinning, and sanitation cutting, the object being to favor the thrifty specimens of the better species by releasing the selected crop trees from crown and root competition. This work is performed by carefully trained organized crews, properly equipped, proceeding through the woods in line formation, each man selecting his crop tree and releasing it from competition.

7. Reforestation and Revegetation of Denuded Areas.--This activity is largely on a special project basis, although general supervision is exercised by rangers and supervisors over the work of temporary employees. Up to the time the national forests were created fires ran rampant and large areas of forest land were devastated. There have also been bad conflagrations since the creation of the national forests, particularly on areas where previous fires had only partially killed the timber. Under our

acquisition program millions of acres have been included within the national forests, particularly in the East. A good portion of these lands had been denuded by destructive logging and fire before being a part of the national forests. Our present reforestation program today provides for the planting of 4 million acres. The objective in reforesting these devastated lands is to preserve the watersheds of navigable streams, to restore municipal and domestic water supplies, to prevent and control erosion, and to grow crops of commercial timber. Planting is done by trained crews of men operating either singly or in pairs, the trees being planted in rows with a spacing between trees of from 4 to 8 feet. The period during which planting can be done is restricted to spring and fall seasons.

8. Nurseries and Planting Stocks.--This activity is conducted mainly through specialists and crews of temporary nursery workers. The first Forest Service effort in growing trees for reforestation work began in small nurseries largely of an experimental nature, most of the work being handled by the permanent employees. Under present plans the annual nursery capacity has been very greatly enlarged so that at the present time the Forest Service is equipped to supply nearly 400 million trees annually. In order to furnish stock for the planting program it is necessary to grow the trees in the nurseries from one to four years, depending on the species to be used and the sites on which the planting will be done. The size of the nursery depends largely on whether seedlings or transplant stock will be grown. In the latter case a much greater area is required. Nurseries are completely equipped with the necessary buildings for carrying on the nursery activities, consisting of workshops, implement houses, bunkhouses, and mess quarters. Water must be made available to the area and is usually so piped as to make possible an overhead spraying system of watering. A force of men must be employed in each nursery from early spring to late fall for preparing the soil, sowing, watering and weeding the seed beds, transplanting, and lifting and packing the trees for field planting.

9. Grazing Use.--Work carried on under this activity is both administrative and technical. Administrative activities have to do with the coordination of domestic livestock forage uses with wildlife, recreation, timber production and protection, and other uses of the national forests. All livestock grazed are covered by formal permit excepting the few head permitted free to settlers, miners, or prospectors or those used in connection with permitted operations. The latter permits sometimes involve relatively more work than the larger, more formal transactions and sometimes require written permits.

Other work consists of the handling of grazing applications for pay permits, stock counting, inspections to determine range readiness and to see that management on different units of range is installed and carried out during the grazing season, studies of these uses in relation to local capacities, supervision of improvement construction such as fences, water development, stock bridges, driveways and stock trails, poison-plant eradiction, handling of complaints and appeals, meetings with stockmen and advisory boards, preparation of annual and periodic reports, and the development and current revision of unit management plans.

The more technical work consists of detailed range surveys and mapping, installation and periodic examinations of observation plots and quadrats, collection and studies of forage plants, palatability observations for different classes of stock and wildlife, and changes in types due to grazing. All this work is basic in determining proper grazing uses and range capacities.

10. Recreation and Land Use.--Work carried on under this activity includes the planning, control, and administration of all forms of occupancy of national-forest lands except only those relating to the use of the forage and timber resources. General surveys of entire national forests are made in order to determine and classify areas suited to each specific use. Because of conflicting demands of various types of uses, careful surveys and planning for each are necessary. The areas that are classified as being suited to recreational use require further surveys and plans in order to determine the specific type of recreational use to which they are best adapted. Careful planning is necessary because the designation of areas as special-use areas, suited for resorts, summer homes, clubs, etc., or for public campgrounds, constitute a practical and permanent dedication to that use.

Within each specific area it is necessary to determine whether the entire area shall be dedicated to special use and beome available for summer homes, clubs, or resorts, or a combination of two or more of these uses, or whether the entire area shall be dedicated to public use and developed as a public campground. It might be finally decided that a specific area should be developed so that a portion would serve as a campground, another portion as a summer hotel or resort site, still another portion as sites for summer homes. All these decisions must be based upon surveys and plans.

On each special-use area it is necessary to survey out each lot, locate each road and service drive, and set stakes on each lot for building locations. On the public-use areas it is necessary to plan the entrance drives, camping areas, campground facilities, parking areas, playgrounds, beaches, etc.

The work involved in administering the special-use business of the Forest Service includes negotiations with prospective permittees, showing them the available sites, issuing permits, the drawing up of minimum requirements, plans, and specifications for each special-use area; review and approval of improvement plans of new permittees, according to the area in which the use is located; making up permits, preparation of letters of transmittal for handling the fees, and inspection of areas for compliance with clauses made a part of the contract or special-use permit.

On public campgrounds, used free of charge by the public, policing is required to assure proper use and maximum utility by the public. On a majority of the public campgrounds this duty is assigned to a regular or temporary seasonal employee of the Forest Service in conjunction with their other duties. On the larger campgrounds it is necessary to assign men as caretakers for the entire camping season. On many of these areas policing, garbage-disposal provisions, and furnishing firewood requires the services of more than one man.

11. Land Classification, Settlement, and Claims.--The lands reserved for national-forest purposes from the public domain are subject to the provisions of the Forest Homestead Act of June 11, 1906 and the Classification Act of August 10, 1912. These Acts require the determination, classification, and listing of all lands chiefly valuable for agricultural purposes and not needed for more important public purposes. The original work of classification was completed a number of years ago, but need for revision, amendments, and readjustments arises intermittently and requires administrative action. Lands listed and entered under these laws require periodic supervision, and preliminary to application for patent reports must be made for the Department of the Interior. The national-forest lands reserved from the public domain also are subject to the general mining laws of the United States and to the public-land laws relating to rights-of-way, easements, etc.., in which cases the Forest Service acts as the field representative of the Department of the Interior, preparing the necessary reports and conducting the required supervision of the development work. There are tens of thousands of mining locations within the national forests and scores of applications for easements, rights-of-way, etc., which require attention each year.

The principal purposes of this activity are to insure (a) that the lands chiefly valuable for agricultural purposes are properly classified and made available for entry, (b) that all the requirements of the public-land laws are satisfactorily met, and (c) that use and occupancy under such public-land laws does not result in illegal or unjustified conflict with the protection and use of the national-forest lands and the public interests inherent therein. The activity entails the use of the time of personnel on the work of field examination, the determination of fact, the preparation of reports, the presentation of evidence in cases of violation of legal limitations, and administrative routine in relation thereto. Proper control of mineral locations requires in itself the permanent employment of two technically qualified mineral examiners in addition to the part-time service of numerous forest rangers and other members of the field organization.

12. Acquisition of Land by Direct Purchase.--This project includes only the time and expenses of employees paid from this appropriation while engaged on this activity, generally in a supervisory capacity. A special appropriation or emergency allotment for the purchase of land has been made for each year since 1911. A special appropriation of $2,500,000 was provided for the acquisition of land in the Agricultural Appropriation Act for 1937, and a further description of this activity will be found under that heading.

13. Acquisition of Land by Exchange.--The national forests contain approximately 25,000,000 acres of land in ownerships other than Federal, these consisting of grants to States and to railroads, various types of entry under the general land laws of the United States, and areas patented under the Forest Homestead Act of June 11, 1906. These lands are widely interspersed among the national-forest lands and frequently complicate and increase the cost of protecting, managing, and utilizing the national-forest properties. Outside but contiguous to the national-forest lands are other forest lands which are integral parts of the same natural units

of forest management, and in a number of instances Congress has authorized the acquisition of such lands by exchange. To date Congress has passed a total of 59 laws permitting acquisition of privately-owned forest lands suitable for national-forest purposes by grants in exchange of not to exceed equal values of national-forest land and/or stumpage in the same State.

The primary purpose of acquiring forest lands by exchange is to bring natural units of forest management, largely in public ownership, under unified plans or programs of management and use, to minimize the creation or maintenance on private lands of conditions of abnormal risk or hazard, and to reduce the high costs of administration created by the occurrence of such private lands upon the Federal lands. The initiation of measures by which the natural productivity and social values of the privately-owned lands may be conserved is also an important requirement.

The conduct of this activity involves the receipt of applications for exchange; the examination, mapping, cruising, and appraisal of the offered lands to determine the maximum values which may be allowed therefor; the comparable examination, mapping, cruising, and appraisal where necessary of the Government lands to be selected in exchange, or of the national-forest stumpage to be granted for the private land; the negotiation of the terms of exchange with the owners of the private land; the preparation of the necessary reports for review by the various executive officers and by the Secretaries of Agriculture and the Interior or their staffs; and the subsequent transaction of the successive routine steps necessary to consummate the exchanges and deliver the national-forest lands or stumpage. During the fiscal year 1936 there were submitted to the Secretary of Agriculture, for approval and transmittal to the Secretary of the Interior, a total of 78 cases involving an aggregate of 226,336 acres of private lands, valued at $618,111, selected areas containing 49,678 acres and valued at $195,589, and selected national-forest stumpage valued at $370,925; in relation to which it was necessary to perform all the functions above cited; the cases in which part or all of the functions were performed during the preceding fiscal year being offset by the other cases requiring similar action which were not submitted until after the close of the year.

14. Fish and Game Protection.--Work under this head consists of cooperation with various Federal, State, sportsmen, and other agencies, cooperation in the enforcement of State and Federal game laws, examination of licenses and their issuance in remote places where the public can not be otherwise effectively served, the giving of information to the public about game laws and wildlife, the requisition and planting of large numbers of fish and the development of fish planting plans, posting game refuges and other protected areas, transplanting beaver, assistance in transplanting game birds and in predatory-animal control, the making of game estimates and the collection of statistical information on species and on game animals killed by man and by predators, the relation in season to game laws and bag limits, inspection and selection of sites for holding and rearing ponds, development of plans for restocking of lakes and streams, supervision of lake construction and stream improvements, game bird surveys with special observations on species threatened with extermination, winter observations on range adequacy for big game and condition of animals, studies of sex ratios, forage requirements, assistance in emergency feeding during

critical periods, the study and correlation of wildlife and domestic stock uses, overpopulations, and the development of game-management plans.

There are now about 1,500,000 big-game animals and almost as many fur-bearers on the national forests. Game birds are also important. The fishing resource is indicated by about 70,000 miles of trout streams and many thousands of natural and artificial bodies of water suitable for game fish in which forest officers planted from State and Federal hatcheries more than 401-1/4 millions of fish in 1933 to 1935. There were constructed during that same period 59 lakes with a total acreage of 5,303.7. Stream improvement facilities numbered 31,084.

15. Construction of Truck and Horse Trails.--Most of the national forests are located in sparsely settled sections of the country and were largely undeveloped and inaccessible when acquired. The major costs of the work on truck and horse trails are borne under the appropriations "Roads and Trails for States, National Forest Fund" and "Forest Development Roads and Trails". The work under this specific project includes the time and expenses of the employees paid from the appropriation "National Forest Administration", and is concerned with the planning and supervision of the construction work, the payment of accounts, maintenance of records, purchase of supplies and equipment, and similar service activities. This appropriation provides for the direct costs of labor, materials, supplies, and direct supervision.

16. Maintenance of Truck and Horse Trails.--The direct costs of maintenance are borne by the Forest Road and Trails appropriations. However, a great deal of time is necessarily spent by the regular personnel in planning, coordinating this project with other activities, supervising the work, paying accounts, hiring personnel, purchasing supplies, and in similar service functions. The scheduling of this work is very important, inasmuch as all roads must be opened in advance of the fire season.

17. Construction of Improvements Other Than Roads and Trails.--Most of the national forests are located in the mountainous regions of the country, largely undeveloped and inaccessible. To facilitate their administration and protection it is necessary to equip them with various classes of improvements.

Telephone lines are needed for fire control in localities where commercial systems are not available, lookout cabins on mountain peaks to house men, and instruments properly located to discover lightning and other fires and to transmit the alarm; lookout towers where the topography does not provide a natural elevation sharp enough to command the necessary view; dwellings, barns, and other structures necessary to provide quarters for men and animals who must be stationed remote from any settlement or rentable quarters; simple office structures for housing records and transacting business required in administrative or fire-control work; fences to prevent the trespass of unpermitted stock or to control the drift of permitted stock in order to secure the best utilization of the national-forest ranges; water improvements in the form of developed springs and wells, pipe lines, and other works required at ranger and other stations, or for watering livestock on the forest ranges, or for public campgrounds; and other campground improvements designed to protect the forests, maintain

sanitary conditions, and facilitate public recreational enjoyment of the forests by providing simple structures, etc.

There are also required certain improvements of a nonstructural nature, such as permanent firebreaks and lanes placed in strategic locations to facilitate holding fires that escape from the initial efforts to control them; the clearing of debris and fallen timber along roadsides to reduce the fire hazard; the improvement and cleaning of fishing streams; and soil-erosion work.

Each national-forest region has a plan for its improvement needs. As funds are made available, those of highest priority are constructed along standardized specifications and simple practical lines.

18. Maintenance of Improvements Other Than Roads and Trails.--This project includes the repair and maintenance of all forms of improvements except roads and trails. The thousands of miles of telephone lines are thoroughly gone over; fallen trees are removed; broken wires are spliced; insulators are replaced and instruments are checked. The wear and tear on buildings and lookout towers in forested country is great. Lightning insulation is repaired, windows are replaced, and guying, painting, roofing, etc., are attended to. Fences are put into shape by post replacement, guying, and wire repair. Springs, troughs, tanks, basins, and piping are cleaned and repaired. Public campgrounds are cleaned up and put in shape, and fire preventive safeguards are freshly overhauled.

19. General Surveys and Maps.--A greater and more intensive utilization of the older forests, the addition of new forest areas, or changes in boundaries of forests for purchase units require markings of property lines, surveys and maps for laying out transportation, dectection and communication systems, special-use and recreation areas, nurseries, administrative stations, lookout towers, water-resource utilization, type mapping, and property ownership. Corrections of existing maps must be secured to make these suitable for Forest Service administration and protection. Some 70 forest maps must be corrected, traced, lithographed, and printed. More accurate locations of topographic features are required for the proper protection and administration of the forests. The Forest Service is not engaged in general quadrangle mapping like that of Geological Survey, in township and sectional surveys like the work of the General Land Office, or upon control surveys similar to those of the Coast and Geodetic Survey. However, where any topographic, cadastral, or control work is done the standards used permit adoption and incorporation with the later work of the other agencies.

20. Equipment and Stores.--This account has been set up to carry stores and equipment remaining in stock at the end of the fiscal year, which has not been charged to another project.

21. Cooperation with Other Departments, Bureaus, and Agencies.--The Forest Service cooperates with other Government departments, bureaus, and agencies on activities not primarily of benefit or producing benefits to national-forest resources. Often the Forest Service is better qualified to carry on such work because of the technical experience of its personnel

or because the geographic distribution of its organizations may enable it to better handle the work from the broad viewpoint of Government economy. This work is done in accordance with the standards established for the various jobs. Illustrative of this work project is the cooperation with the Bureau of the Census in their agricultural and lumber censuses; cooperation with the National Park Service, the Bureau of Indian Affairs, and the War Department regarding forestry problems on their lands; cooperation with the Department of Justice and the Treasury Department in law enforcement where national-forest lands are involved, etc.

(d) WATER RIGHTS

Appropriation, 1937..... $10,000
Budget Estimate, 1938..... 10,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Investigation and establishment of water rights.....	- - -	$10,000	$10,000

WORK UNDER THIS APPROPRIATION

The State of Arizona has instituted suit against the other States embracing the drainage of the Colorado River, which may result in the permanent adjudication and decree of all rights to the use of waters draining into the Colorado River and conceivably deprive the United States of water rights vitally indispensable to the proper protection, management, and use of millions of acres of national-forest lands, or might necessitate expensive litigation to establish such rights. The $10,000 appropriation provided by this item is for the study and determination of all rights essential to the proper use of the national forests with a view to permanently establishing such rights by filings and appropriations under State laws or by other appropriate means. The appropriation should be continued until the water-right situation in the Colorado River drainage is clarified.

(e) FIGHTING FOREST FIRES

Appropriation, 1937.....	$100,000
Budget Estimate, 1938.....	100,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Fire suppression.....	$1,278,551	$33,000	$33,000
2. Protection of lands, railroad forfeiture units.....	85,000	67,000	67,000
Unobligated balance.....	13,158	- - -	- - -
Total appropriation.....	(a)1,376,709	(b) 100,000	100,000

(a) Includes $1,276,709 forest-fire deficiency provided by Supplemental Appropriation Act, 1936.
(b) Regular appropriation; does not include 1937 fire-fighting deficiency.

WORK UNDER THIS APPROPRIATION

This appropriation is used primarily for the suppression of forest fires including protection to the lands known as the Coos Bay Wagon Road and Oregon and California railroad lands, which receive the same protection from fire as that given to adjacent national forest and to privately owned lands protected by associations of private owners. Otherwise administrative restrictions placed upon the use of the appropriation by the Forest Service provide that expenditures shall not be made therefrom until forest fires have actually started. An exception is made to this rule, however, when fire conditions become so critical that the regular protective organization which is financed from the appropriation "National Forest Administration" is unable to cope with the situation and when, therefore, the temporary employment of additional guards clearly will reduce expenditures for fire fighting.

Expenditures are made for the employment of fire fighters and their transportation, for equipment needed on going fires when not available in stocks of equipment previously purchased from the "National Forest Administration" appropriation, or in connection with fires of previous years. The appropriation is used for travel expenses of forest guards when going to or returning from fires and for the travel expenses of regular employees of the Forest Service when the travel performed extends beyond the boundaries of the units to which they are regularly assigned, or when the activities to which men are regularly assigned do not include fire fighting.

The amount appropriated ($100,000) is nominal because it is impossible to predict in advance what the expenditures for such an uncertain activity may be. Supplemental estimates are submitted each year for the Deficiency Bill to cover expenditures which have been necessary in excess of the amount appropriated in the regular Appropriation Act.

Forest Research

(f) FOREST MANAGEMENT

	Regular	Emergency	Total
Appropriation, 1937.....	$620,994	$286,707	$907,701
Budget Estimate, 1938.....	660,903	- - -	660,903
Net change.....	+39,909	-286,707	-246,798

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
1. Silvicultural investigations:				
Regular funds.....	$246,581	$286,450	$296,359	+ $9,909(1)
PWA emergency funds.....	1,180	- - -	- - -	- - -
Emergency relief funds.....	221,882	169,638	- - -	-169,638
Total.....	469,643	456,088	296,359	-159,729
2. Mensuration:				
Regular funds.....	45,763	40,900	40,900	- - -
Emergency relief funds.....	18,726	14,317	- - -	-14,317
Total.....	64,489	55,217	40,900	-14,317
3. Forest regeneration:				
Regular funds.....	60,130	78,075	108,075	+ 30,000(2)
PWA emergency funds.....	92	- - -	- - -	- - -
Emergency relief funds.....	46,638	35,656	- - -	-35,656
Total.....	106,860	113,731	108,075	-5,656
4. Fire protection:				
Regular funds.....	81,764	117,950	117,950	- - -
PWA emergency funds.....	146	- - -	- - -	- - -
Emergency relief funds.....	50,524	38,628	- - -	-38,628
Total.....	132,434	156,578	117,950	-38,628
5. Naval stores:				
Regular funds.....	11,681	17,314	17,314	- - -
Emergency relief funds.....	10,953	8,374	- - -	-8,374
Total.....	22,634	25,688	17,314	-8,374
6. Forest genetics:				
Regular funds.....	52,159	80,305	80,305	- - -
PWA emergency funds.....	305	- - -	- - -	- - -
Emergency relief funds.....	4,593	3,512	- - -	-3,512
Total.....	57,057	83,817	80,305	-3,512

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
Total obligations:				
Regular funds	$498,078	$620,994	$660,903	+$39,909
PWA emergency funds	1,723	- - -	- - -	- - -
Emergency relief funds	353,316	270,125	- - -	-270,125
Total	853,117	891,119	660,903	-230,216
Unobligated balance (regular funds)	6,416	- - -	- - -	- - -
Total (all funds):				
Regular funds	504,494	620,994	660,903	+ 39,909(A)
PWA emergency funds	1,723	- - -	- - -	- - -
Emergency relief funds	353,316	270,125	- - -	-270,125
Total	859,533	891,119	660,903	-230,216

INCREASES

(A) The increase of $39,909 in regular funds for 1938 includes:

(1) An increase of $9,909 for investigations in the management of pinon-juniper and other woodland types of the Southwest. The pinon-juniper type alone occupies over one-fourth of the land area of the Southwest. It furnishes local farmers and ranchers products of great value, including fuel, fence posts, poles, and pinon nuts. It is of great importance in watershed protection. The pinon-nut crop brings returns to the ranchers and to the Indians approaching half a million dollars annually. These yields can be greatly increased with proper management and careful selection and development of high-yielding strains. Methods must be worked out to secure maximum growth and yield and natural and artificial propagation of the several tree species involved based on an adequate understanding of their life histories and ecological requirements. No funds are now being expended in this type.

(2) An increase of $30,000 for forest regeneration investigations, to be expended as follows:

(a) $15,000 for investigations to enable the conversion of brushfields in northern California into valuable timber stands. Worthless brushfields, the result of heavy cutting and repeated fires, occupy more than two million acres of potential timberland in north-central California. An additional three million acres of cut-over timberland lacks seed trees and will succumb to brush invasion unless remedial action is taken. These now worthless areas include some of the best and most accessible forest sites in California, capable of producing 750 million board feet of timber annually. Methods of converting these brushfields into productive stands of valuable timber, either by natural or artificial means, must be determined. This will require

detailed knowledge of the soil and moisture requirements and a determination of the influence of rodents, grazing, and fire on tree regeneration. No funds are now being expended for this work.

(b) $15,000 for planting and reforestation studies on fifteen million acres of seriously eroding lands in the Central States exhausted and abandoned by agriculture. A tremendously expanded reforestation program is under way in the Central States region by various Federal and State agencies. Tree planting is also being undertaken on a large scale by farmers under the agricultural conservation program. A considerable part of past large-scale tree planting has resulted in failure due to improper methods, to unsuitable planting stock, or to especially adverse local conditions. Success depends on an adequate knowledge of desirable nursery and planting methods and on the suitability of the various tree species used. Unless such information is obtained very promptly costly mistakes and delays are inevitable. As the region affected includes extensive areas of the drainage basins of the Ohio, Mississippi, and Missouri Rivers, where rapid run-off from abandoned or submarginal lands adds materially to flood problems, a knowledge of how best to establish a forest cover is of the utmost importance. No funds are now being expended for this purpose.

WORK UNDER THIS APPROPRIATION

General.--The research carried under this appropriation is concerned with the problems of establishing and growing forest crops on forest land, regardless of ownership, and of protecting them from fire. Investigations at present are under way in all the important regions in the United States except in the Great Plains. In each region emphasis is being placed upon the most pressing and urgent problems. These investigations are basic to the successful practice of forestry.

Forest-management investigations supply the facts on which sound forestry practices are based. Specifically, they aim to provide the information needed by Federal, State, and private agencies and individuals to enable them to reforest, protect from fire, and manage forest land to the best advantage, to insure an adequate future supply of lumber and other forest products, to increase the quality and quantity of forest products, and to maintain forest cover where needed for recreation and the protection of watersheds and wildlife. They have developed methods, which are being applied on a national scale by the C.C.C., in stand improvement, reforestation, hazard reduction, and fire control. They have disclosed many of the fundamental principles bearing on the location of lookouts, firebreaks, and roads and trails being constructed on the national forests and the national parks. They are supplying data on reforestation and naval-stores practices to the Agricultural Adjustment Administration and are furnishing basic data on growth, forest management, and forest protection to the States and to various other public and private agencies. These investigations also supply information needed in the management and protection of the national forests. The work is specifically authorized by Section 2 of the Act of May 22, 1928 (McNary-McSweeney Forest Research Act) and is being carried out under the following projects:

1. Silvicultural Investigations.--This project furnishes basic information necessary to manage forest lands and to grow forest trees as a crop. Because of the great diversity of growing conditions over 50 major forest types and 180 commercially important forest tree species have to be dealt with. Diversity of ownership and interests further complicate the problems of forest-land management. Prior to the establishment of the Forest Service little was known about the habits, requirements, and possibilities of American forest-tree species and types, and the information available today is far from complete. Specifically, silvicultural investigations aim to determine the distribution, habits, requirements, and ecological relations of the more important forest tree species and types; and how commercially important forest types are to be managed to insure perpetuation of the more desirable features, maximum forest production, sustained yield, and high-quality forest products. Such information is essential to the proper management of the national forests and is urgently needed by State and private forest landowners if forest cover is to be maintained, watersheds protected, and the country's future needs for forest products supplied. This work is now carried on by 12 regional forest experiment stations.

2. Mensuration Investigations.--The object of this project is to determine the rate of growth of trees and stands. It includes the preparation for each of the commercially important forest-tree species of "volume tables" showing the average contents of trees of different dimensions and conditions in terms of cubic feet, board feet, cords, and other units; "growth tables" showing the average relation of height, diameter, and volume to age; and, for each of the commercially important forest types, "yield tables" showing the characteristics of the stand at different ages and the yield to be expected under various conditions and methods of handling. There are about 180 forest-tree species and 50 or more forest types of commercial importance in the United States about which such information is needed. In addition, it is necessary to standardize the form and substance of such tables and the technique of their preparation and application, to explore the fundamental laws of form and growth, and to adapt and apply statistical methods to the solution of other American forestry problems. Work is under way on this project at Washington, D. C., and at 10 regional forest experiment stations.

3. Forest Regeneration Investigations.--This work involves the further development of methods of reforesting denuded or poorly-stocked forest land. It is estimated that there are 83,000,000 acres of such land in need of planting. Accordingly, it is necessary to determine for each of a large variety of conditions the species and methods of regeneration to be employed, the best method and season of direct seeding, where direct seeding is possible, the size and class of planting stock to be used, where planting is necessary, the details of nursery practice and the technique of field planting, and ways and means by which natural regeneration can be induced or stimulated. This involves examination of past plantings to determine the causes of success or failure, studies of seed production and dissemination, and studies of nursery methods and planting technique. Work of this sort is now in progress at 10 regional forest experiment stations.

4. Fire Protection Investigations.--Work in this field deals with the effects of forest fires and with ways and means for their prevention and control. Specifically, studies are being made of procedures by which forest fires can be prevented, of equipment and methods best suited to detect and control fires under different conditions, of the relation of weather, topography, and fuel conditions to the occurrence and behavior of forest fires, of how periods of high hazard can be forecast, of the extent and character of the damage resulting from forest fires, season of occurrence, concentration, cause and probability, and of the degree of hazard prevailing in each of the various protection units and forest types involved. Work of this sort is now under way at eight regional forest experiment stations.

5. Naval Stores Investigations.--The naval-stores industry has long been important in the South. Early methods of turpentining were crude and inefficient and resulted in the waste of much valuable timber. The object of these investigations is to further improve the technique of turpentine production and the equipment used; to determine the effect of tree size, weather conditions, and surface fires on yield; to study the effect of various methods of turpentining on tree growth and timber quality, and to work out the best means of combining turpentining and timber production. Investigations are now under way at the Southern Forest Experiment Station.

6. Forest Genetics Investigations.--The segregation or production of desirable strains by breeding, a procedure which has proved invaluable with crop plants, is practically unexplored with respect to forest trees. Work under this project is aimed at the production of trees of higher rates of growth, more resistant to diseases and insects, of better form, and capable of producing higher-quality forest products. This involves the study and segregation of geographical strains and races, studies of the technique of natural and artificial cross pollination and fetilization, experiments in hybridization, investigations of the genetical constitution and transmission of desirable characteristics, field trials of promising individuals and strains, and similar studies. The work is conducted at the California and the Northeastern Forest Experiment Stations.

(g) RANGE INVESTIGATIONS

	Regular	Emergency	Total
Appropriation, 1937.....	$181,935	$69,155	$251,090
Budget Estimate, 1938.....	225,935	- - -	225,935
Net change.....	+ 44,000	-69,155	-25,155

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
1. Grazing management investigations:				
Regular funds.....	$114,876	$134,717	$168,717	+ $34,000(1)
PWA emergency funds.....	922	- - -	- - -	- - -
Emergency relief funds.....	71,927	54,992	- - -	-54,992
Total.....	187,725	189,709	168,717	-20,992
2. Artificial reseeding:				
Regular funds.....	21,746	33,218	43,218	+ 10,000(2)
3. Range forage:				
Regular funds.....	14,181	14,000	14,000	- - -
Emergency relief funds.....	13,295	10,164	- - -	-10,164
Total	27,476	24,164	14,000	-10,164
Total obligations:				
Regular funds.....	150,803	181,935	225,935	+ 44,000
PWA emergency funds.....	922	- - -	- - -	- - -
Emergency relief funds.....	85,222	65,156	- - -	-65,156
Total.....	236,947	247,091	225,935	-21,156
Unobligated balance (regular funds).....	3,632	- - -	- - -	- - -
Total (all funds):				
Regular funds.....	154,435	181,935	225,935	+ 44,000(A)
PWA emergency funds.....	922	- - -	- - -	- - -
Emergency relief funds.....	85,222	65,156	- - -	-65,156
Total.....	240,579	247,091	225,935	-21,156

INCREASES

(A) The increase of $44,000 in regular funds for 1938 includes:

(1) An increase of $34,000 for grazing management investigations, to be used as follows:

(a) $10,000 for studies in the control of shrub invasion on semi-desert ranges of the Southwest. A widespread replacement of palatable grasses by almost worthless, even poisonous plants, such as burroweed, snakeweed, cactus, live oak, and manzanita, is occurring on the Southwestern forest ranges. Stockmen are greatly concerned and are asking for advice as to methods for checking this invasion. Some have resorted to burning but have thereby intensified forage and soil depletion. The semidesert range lands in New Mexico, Arizona, and western Texas aggregate over 125 million acres and are grazed by some 16 million cattle, sheep, and goats, involving an investment of about $394,000,000. Over half of this area is vitally important in watershed protection; it adds hundreds of tons of silt to the rivers furnishing water for over 2 million acres of irrigated lands in which are invested over $100,000,000. Grazing use of most of this area has been so severe as to diminish the average range productivity by 60 percent; and that of many ranges has decreased as much as 90 percent. Drought and its after-effects still threaten the economic welfare of the entire region. Many areas are now submarginal for livestock grazing, as shown by the large proportion of stockmen forced out of business in each major drought period. Repercussions felt in other businesses also show the critical nature of the use of these lands.

Studies under this increase would emphasize especially the checking of the invasion of worthless plants through improved management practices, grubbing, or other means and the extension of the investigations to types in which no work has yet been done.

(b) $24,000 for determination of standards of satisfactory forage utilization on western ranges. Western stockmen are so beset by overcapitalization, high interest, adverse freight differentials, etc., that they place too many stock on the range in a vain effort to make ends meet. More than 17 million animal units are grazing on ranges that should support only 10-1/2 million. One of the greatest handicaps to corrective action is the lack of simple and practical utilization standards or "yardsticks" which stockmen and range administrators understand and accept. Lacking such standards, stockmen vigorously resist any attempts of the Government to reduce stocking on Federal lands, even though continued exploitation of the range forage is destroying the basic capital on which the industry is built, impairing watershed and wildlife values, and jeopardizing the whole interdependent range and farm agriculture of the West, valued at nearly $13,000,000,000. These and other findings of the Norris Report (Senate Doc. 199) emphasize the need for intensive study of the many factors that affect utilization, such as the effects of the widely-varying and extremely dry climate upon vegetation, the wide variation in values of plants on the range, and the necessity for restricting the grazing of all plants so as not to injure the principal palatable ones.

The increased funds requested will permit a study of this problem on national-forest ranges, where, even after heavy cuts in numbers have already been made, a further reduction is necessary.

The study would be handled by the six western forest and range experiment stations, in cooperation with the State agricultural colleges.

(2) An increase of $10,000 for artificial reseeding investigations on forest and other range lands by the Northern Rocky Mountain Forest and Range Experiment Station. The more than 5 million acres of range lands in Montana alone, which were plowed in efforts at dry farming and have now been abandoned, together with an even greater area of forest and other range lands denuded or badly deteriorated through overgrazing and fire, presents a serious problem. This situation is a chief cause for the acute economic and social distress so prevalent in the semiarid portion of the northern Rocky Mountain region. The stranded settlers are in large proportion on relief and the local government can not bear the burden of such areas of unproductive land. The rehabilitation of this land for use by range livestock on a profitable basis is essential to the future prosperity of the region. Artificial reseeding with suitable forage plants would greatly speed up restoration. The proper species of forage for the various types of soil and climate and the best season, depth, and methods of sowing must be worked out and correlated with the low cost at which rehabilitation of these lands must be effected. While some promising progress, using trial and error methods, has been made with emergency funds, nothing approaching the study which the situation needs has been undertaken.

WORK UNDER THIS APPROPRIATION

General.--The work under this appropriation consists of investigations to develop better methods of management of forest and other ranges. It is furnishing basic technical information necessary for the administration of the range resource in the national forests and on other ranges, public and private. It is also formulating the methods necessary for range improvement, revegetation for erosion control, and other range-land phases of the work of the C.C.C. and unemployment relief projects. The studies of range management to offset destructive drought losses have aided immeasurably in relief and land-use adjustments. The 900 million acres of forest and untimbered range land represent nearly half the land area of the United States. Forage productivity of the great western range has been decreased over 50 percent through overgrazing and drought as shown by the Norris Report (Senate Doc. 199). Sound range-management practices are necessary for the conservation of the range resources and to assure the stability and economic welfare of the livestock industry dependent upon these lands. These investigations alone can supply the required information.

Range research is being carried on under the authorization contained in Section 7 of the Act of May 22, 1928 (McNary-McSweeney Forest Research Act). The projects include:

1. Grazing Management Investigations.--This work consists of investigations to develop methods for managing range lands that will assure the stability and perpetuation of range resources, including forage, watershed, timber reproduction, and other range-land values. It involves determination of the grazing capacity of various range types and of ways and means of restoring and maintaining the better forage plants, improving methods of handling livestock on ranges, controlling losses from poisonous plants, reducing the fire hazard by grazing, and harmonizing grazing with other range-land values.

The studies involve high summer ranges, mainly on national forests, foothill spring-fall ranges, desert winter ranges, and semidesert year-long ranges. These studies have aided greatly in the better coordination for profitable use of these important parts of the year-long livestock operation, and they promise additional results urgently needed by the livestock industry and by the Federal and State governments in their emergency programs and in their plans for permanent land-use and development. This work is now conducted at the six regional forest and range experiment stations in the West.

2. Artificial Reseeding Investigations.--This work includes investigations to develop artificial methods of restoring the plant cover on seriously depleted ranges and abandoned dry farms. Studies are under way to determine what native species justify selection for improvement, the possibilities for adapting native and introduced species for seeding or transplanting, and how they can be most economically reproduced and established on range lands. These studies promise results of vital importance to the range livestock industry and to Federal and State agencies in planning sound land use on a permanent basis. The work is being conducted mainly by the Intermountain Forest and Range Experiment Station.

3. Range Forage Investigations.--Work under this project includes the collection and analysis of information on the identity, distribution, and the forage and watershed protective and other values of over 12,000 plant species which inhabit forest and other ranges--information absolutely essential to good range management. It includes the building up of the most complete annotated working herbarium of range plants in the country, a basic feature in meeting the demands for information incident to these studies. This is a continuing study. Range plants and data are collected by all the administrative and research personnel of the Forest Service concerned with range management. The major compilation and analyses are made in Washington.

(h) FOREST PRODUCTS

	Regular	Emergency	Total
Appropriation, 1937.....	$608,361	$149,315	$757,676
Budget Estimate, 1938.....	628,361	- - -	628,361
Net change.....	+20,000	-149,315	-129,315

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
1. Timber harvesting:				
Regular funds.....	$89,167	$89,300	$89,300	- - -
Emergency relief funds.....	40,427	30,908	- - -	-$30,908
Total.....	129,594	120,208	89,300	-30,908
2. Forest products statistics:				
Regular funds.....	8,815	8,900	8,900	- - -
Emergency relief funds.....	586	448	- - -	-448
Total.....	9,401	9,348	8,900	-448
3. Pulp and paper:				
Regular funds.....	94,789	95,000	105,000	+ 10,000(1
Emergency relief funds.....	41,990	32,103	- - -	-32,103
Total.....	136,779	127,103	105,000	-22,103
4. Strength of wood:				
Regular funds.....	85,287	141,161	141,161	- - -
Emergency relief funds.....	18,554	14,185	- - -	-14,185
Total.....	103,841	155,346	141,161	-14,185
5. Seasoning and physical properties:				
Regular funds.....	60,076	70,000	80,000	+ 10,000(2)
Emergency relief funds.....	23,045	17,619	- - -	-17,619
Total.....	83,121	87,619	80,000	-7,619
6. Chemical composition:				
Regular funds.....	55,121	59,000	59,000	- - -
Emergency relief funds.....	11,913	9,108	- - -	-9,108
Total.....	67,034	68,108	59,000	-9,108
7. Wood preservation:				
Regular funds.....	68,936	95,000	95,000	- - -
Emergency relief funds.....	32,810	25,085	- - -	-25,085
Total.....	101,746	120,085	95,000	-25,085

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
8. Wood structure:				
Regular funds.....	$44,896	$50,000	$50,000	- - -
Emergency relief funds.....	25,975	19,859	- - -	-$19,859
Total.....	70,871	69,859	50,000	-19,859
Total obligations:				
Regular funds.....	507,087	608,361	628,361	+ 20,000
Emergency relief funds.....	195,300	149,315	- - -	-149,315
Total.....	702,387	757,676	628,361	-129,315
Unobligated balance (regular funds).....	1,274	- - -	- - -	- - -
Total (all funds):				
Regular funds.....	508,361	608,361	628,361	+20,000(A)
Emergency relief funds.....	195,300	149,315	- - -	-149,315
Total.....	703,661	757,676	628,361	-129,315

INCREASES

(A) The increase of $20,000 in regular funds for 1938 includes:

(1) An increase of $10,000 for studies in the utilization of new woods for paper making. The desirability of the wider utilization of little-used wood species for paper manufacture is obvious. Until recently the paper industry depended largely on spruce, fir, and hemlock. In recent years studies have led to a sizable pulp development in the South, Northwest, and in the Lake States. The successful use of new woods from these regions depends upon solving problems which continue to arise as their commercial development is prosecuted. With the additional funds requested investigations will be made of species utilization to include such promising woods as gum, willow, and cottonwood in the South; maple, birch, and aspen in the Eastern and Lake States; Douglas fir, the true firs, lodgepole pine, and redwood in the West; and of various logging and milling wastes. This whole field of work will tend to render the Nation self-sufficient in regard to its pulp and paper needs.

(2) An increase of $10,000 for experiments on the chemical seasoning of wood, particularly those species, sizes, and shapes which cannot be satisfactorily seasoned by ordinary methods. The two common methods of seasoning wood, air drying and kiln drying, have failed to produce satisfactory results in seasoning boards and planks of refractory species, as well as the larger sizes of all species. Chemical treatments offer the possibility of seasoning such material with little or no degrade and with less subsequent swelling and shrinkage. Chemical seasoning consists of the impregnation of green wood with

a water-soluble chemical before drying starts. This new process has already accomplished some remarkable results in the laboratory. The development of the process to the point of practical application requires full-scale experimentation, combined with observation of the conditions introduced by the presence of the chemical in the dry wood. Proper selection of the chemical should obviate such objectionable features as sweating of the wood at high humidities, corrosion of attached metal, and increased electrical conductivity and at the same time should increase fire and decay resistance and improve other desirable properties of the wood.

WORK UNDER THIS APPROPRIATION

General.--Forestry is not only concerned with producing timber but with its efficient utilization by satisfied consumers. The foundation of efficient utilization is research in forest products. While the importance of stream control, recreation, and the prevention of erosion may vary with different regions, there is involved to an extent in every region, and predominantly in some, the problem of ultimately using the timber crop. The far-reaching forestry program of the Federal Government is designed to increase the production of timber on both public and private lands. The program will be far more successful if it provides for the fullest and best utilization of the timber as it becomes ready to harvest.

Upon the efficient production and marketing of forest goods on a steadily increasing scale depend permanent jobs for several million wage earners; permanent tax revenues and fiscal stability for rural communities throughout 600 million acres of forest lands; and adequate return on billions of dollars of public and private investment in forests and forest industries.

Forest-products research is necessary to assure full returns from the silvicultural improvements on public lands under the Emergency Conservation Work; from private forest lands under sustained yield management; from the ruralization of the forest industry in the Tennessee Valley; and from many Resettlement projects. It is especially necessary to the Administration's vast housing and home-renovation program, which will require wood as a major construction material.

The bulk of the work in forest-products research is centered at the Forest Products Laboratory at Madison, Wisconsin, with some associated work at forest experiment stations and at Washington, D. C. Since its establishment in 1910 the Laboratory has become the outstanding institution of its kind in the world. Conservative estimates place the annual savings to users and producers, alone through application of Laboratory findings, at a figure at least 100 times the cost of operation. Only a small part of the needed work in forest products has been done. There can be no question of the vital part that forest-products investigations play in the whole forestry program.

The work is done under the authorizations for forest products investigations of domestic woods and of tropical woods specified under Section 8 of the Act of May 22, 1928 (McNary-McSweeney Forest Research Act). It is conducted under the following projects:

1. Timber Harvesting and Conversion Investigations, including costs and returns in logging and milling trees and logs of different sizes; design of logging machinery; selection and grading of lumber; and wood-use development.

Millions of acres of barren cut-over land in the South, the East, the Lake States, and of late in the West are the result of the general belief among timber operators that maximum returns necessitated felling all trees of the desirable species that would cut out any lumber. The owner of forest land is now learning that practically his only chance of low-cost and high-yield continuous production is to evaluate returns on the basis of analytical data, such as the Forest Service has recently been making available, which dictate removal of the larger trees and leaving the smaller trees for growing stock.

Under prevailing practice the timber left, or that has restocked the cut-over areas, has been largely of so-called inferior species--aspen and birch in the Lake States; beech and birch in the East; elm, hackberry, tupelo, and low-grade oaks in the South; and white fir, western larch, and western hemlock in the West. To enable the removal of these species and thereby to improve the forest, by putting them to use on the basis of their best utility values, is a major forestry problem and a feature of this project. This is coupled with the problem of converting the present 50 percent waste in the woods and at the mill into marketable commodities.

Lumber is separated at the mill into classes or grades on a basis of the number, condition, and size of visible defects. Rules for grading have become more and more complicated, with resultant difficulties and misunderstanding between manufacturers and users. The Forest Products Laboratory has played a prominent part in various movements to improve and simplify grading rules. Federal specifications prepared by the Forest Service govern the purchase of lumber by the Government.

2. Forest Products Statistics, including the production, consumption, and distribution of forest products.

Information as to the production, consumption, and distribution of lumber and other forest products is essential to the orderly manufacture and marketing of forest products; the maintenance and proper distribution of adequate and suitable supplies of raw material for wood users; and as a basis for planned forest production. These data form the necessary economic background needed by Federal, State, and private agencies dealing with forest, industrial, and social programs and policies and are basic to the forest-economic investigations of the Forest Service.

The work is handled by statistically trained foresters in the Washington office and at several of the western forest experiment stations. Under a cooperative agreement with the Bureau of the Census, data are obtained from the forest industries concerned by a canvass and are then compiled, analyzed, and published.

3. Pulp and Paper Investigations, including studies of the suitability of various woods for pulps and papers and the development of new and improved manufacturing processes.

The value of pulp and paper products made annually in the United States is, roughly, $1,000,000,000. The domestic consumption of wood for paper is approximately 6-1/2 million cords (about 12 percent of which is imported), valued at $50,000,000. In addition, wood pulp and paper are imported to the equivalent of about 6 million cords of wood.

The use of wood for pulp far exceeds that of any other raw material and, although the quantity thus used constitutes only about 5 percent of the total timber cut of the United States, it is of large importance by virtue of being a profitable outlet for a class of timber and for wood wastes having practically no other value except as fuel. Furthermore, the removal of much of this material (as thinnings, etc.) is a feature of good forestry.

Looking to the future, making the United States self-sufficient as to pulpwood requirements could mean doubling the national income from pulpwood, with added large values from manufacture, and jobs for 250,000 more persons than were engaged in the pulp and paper industry in 1929.

Definite progress has been made by the constant search for new or modified processes that will enable using woods other than spruce, which now supplies 70 percent of our pulp and paper requirements. As a result of work by the Forest Service and other organizations, much prominence has recently been given in the press to the Southern pines as a possible source of newsprint. This work on southern pine will be continued, as will the work to find a process adapted to pulping Douglas fir, especially in the form of woods and mill waste, of which enormous quantities are available; and also the work to check stream pollution by developing methods of recovery and re-use of waste cooking liquors.

4. Strength of Wood Investigations, including strength and related properties of wood and improvement in design of structures, containers, and other wood products.

Besides its importance to the average citizen and home builder, this project has a vital relation to the utilization of timber and the liquidation of forestry investments. Building construction normally consumes more than 60 percent of our annual lumber production, a large proportion going into small houses. In recent years, however, the use of wood in buildings in comparison with other materials has shown a great decline, chiefly because lumber in construction does not reflect the modern trends toward lower costs in the handling and assembly of other materials.

Improvements in the engineering of wood construction such as are now under study at the Forest Products Laboratory to make possible the building of simple and inexpensive but thoroughly satisfactory wooden houses would mean more desirable homes for families with small resources as well as new life in the construction industry. New developments in heavy timber construction which are now under investigation also promise a great advance in engineering economy. About one-sixth of the total lumber production is used

for boxes and crates. Improvements in these and other containers benefit the consumer through their effect on the cost of shipping the products he uses.

This project involves strength tests of the clear wood of all commercially important species, both from virgin and second-growth stands in various forest regions; investigations of factors affecting properties, such as defects, moisture content, and weight; appraisal of the effect of preservative, seasoning, and other processes; and determination of the efficiency of nails, bolts, screws, glues, and other mediums for joining wood members or parts.

5. Seasoning and Physical Properties, including studies of kiln drying, air seasoning, and storage of lumber; of the moisture content of wood in use; of seed-extraction equipment; and of the insulation of buildings.

Improper seasoning methods and poor storage, handling, and construction practices cause losses of more than $100,000,000 annually. They include the entire loss of certain species which can not now be seasoned; the loss of footage and value through degrade; and the damage from swelling, shrinking, and warping of fabricated products and structures. The reduction of these losses, in whole or large part, is the goal of the Laboratory's work.

Kiln-drying principles and methods developed at the Laboratory have revolutionized the kiln-drying industry. More than half the kilns built in the United States in the past five years are of the internal fan type developed at the Laboratory.

6. Chemical Composition and Wood-Utilization Investigations, including studies of the chemical composition and utilization of wood; of physical-chemical structure and properties; and in the development of improved and new chemical processes and products.

Wood constitutes the largest and most convenient source of cellulose, one of our most important raw materials. Chemical means must be used in isolating the cellulose because the lignin with which it is surrounded resists all other methods. Science confidently looks forward to the conversion of cellulose into other important commodities in addition to paper, artificial silk, fabric, cellophane, lacquers, and plastics for which it is now used. Lignin comprises one-quarter of the wood but, because of its chemical complexity, no method of utilizing it has been devised. It is wholly wasted in the pulping processes. Since both cellulose and lignin must be isolated by chemical means and converted into other commodities by chemical processes, the economic importance of a thorough knowledge of their chemical nature can hardly be overestimated.

The chemical composition of wood substance, the arrangement of constituent parts in the wood cell, the size and spacing of the cells, and the variation of all such characteristics according to species and growth conditions are intrinsic factors which determine the useful properties of wood in mass. The aim of this project is to attain a scientific understanding of these factors, which is essential to the best results in growing the wood, in its selection, its seasoning and handling, its impregnation with preserva-

tives, its use in construction, and its conversion into pulp and other products. The work involves the conversion of wood waste into wood-distillation products, grain alcohol, plastics, and other useful materials.

7. Wood Preservation Investigations, including studies of wood treatments to increase resistance to decay, insects, and fire; and of coatings, paints, glues, and laminated construction.

Rail transportation costs depend to a considerable degree upon economy and efficiency in the use of wood for railway ties, bridges, poles, piling, and other construction. The railroads use nearly one-fifth of the total annual lumber production and spend over $100,000,000 per year for wood and much larger sums for its treatment and installation. Preservative treatment has greater influence than any other factor in reducing annual costs for wood used by railroads. Likewise public-utility costs are influenced by the efficiency obtained in the use of poles and other wood in the distribution systems.

Fire losses in wooden structures constitute an enormous loss that can be reduced by the discovery of cheap and effective fireproofing methods. The cost to home owners of maintaining the paint on their property is estimated at $375,000,000 annually. The strength and durability of glue joints have a profound influence upon the service given by glued products, for which the public pays about $1,000,000,000 per year. Losses from defective gluing are heavy. The performance of wood in floors, furniture, house trim, aircraft, and numerous other uses is impaired by shrinking and swelling with moisture changes, the prevention of which is of the highest importance in maintaining markets for wood. The work under this project is largely of direct value to the consumer.

The work involves experiments to improve wood preserving processes; service records of treated material subjected to conditions of actual usage; records of the lasting qualities of various paints applied to wood panels of different species and exposed in various regions; tests to determine the fire resistance of both small pieces subjected to fire-resistant treatments and of full-sized structural units; and the improvement of glues and gluing methods.

8. Wood Structure and Growth Investigations, including the microscopic identification of wood; and studies of the relation of growth conditions to wood quality, the relation of structure to properties, and the formation of resin.

Knowledge of wood structure is essential in identifying the thousands of wood and pulp samples submitted by Government officials and the public. Such identifications aid in selecting the right kind of wood for a given purpose in adjusting disputes between buyers and seller, and many times have proved very helpful in criminal cases involving wood.

Knowledge of the relation of growth conditions and structure to properties makes it possible to overcome trade prejudices and to broaden the uses of wood, to safeguard the public against defective material, and

thus to increase the value and efficiency of wood in service. The information obtained is of value in selecting species for reforestation, in the profitable use of marginal agricultural lands and overflow lands for producing future forest crops, and in controlling the growth factors which influence the properties of the wood.

(i) FOREST SURVEY

	Regular	Emergency	Total
Appropriation, 1937.....	$200,000	$59,047	$259,047
Budget Estimate, 1938.....	220,000	- - -	220,000
Net change.....	+20,000	-59,047	-39,047

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
Forest survey:				
Regular funds.....	$249,085	$200,000	$220,000	+$20,000(1)
PWA lieu funds.....	12,915	- - -	- - -	- - -
PWA emergency funds.	2,887	- - -	- - -	- - -
Emergency relief funds.....	77,233	59,047	- - -	-59,047
Total.....	342,120	259,047	220,000	-39,047
Unobligated balance (regular funds).....	915	- - -	- - -	- - -
Total (all funds):				
Regular funds.....	250,000	200,000	220,000	+20,000(1)
PWA lieu funds.....	12,915	- - -	- - -	- - -
PWA emergency funds.	2,887	- - -	- - -	- - -
Emergency relief funds.....	77,233	59,047	- - -	-59,047
Total.....	343,035	259,047	220,000	-39,047

INCREASE

(1) An increase of $20,000 in regular funds for the forest survey is urgently needed to avert seriously handicapping this fundamental investigation upon the basis of which national principles, policies, and plans for forest-land management and use must be formulated. The forest survey was originally contemplated as a 12 to 15 year proposition. Half of that period is now gone, but only 40 percent of the territory to be surveyed has been covered by the field work so far done and only 10 percent

of the equally important and much more difficult office work involved has been accomplished. Even this progress has been possible only through the aid of emergency funds. There is no assurance, however, that any emergency funds will be available for this type of work for the fiscal year 1938. The great and immediate significance and value of the forest survey work to the whole country will be largely lost if an indefinite number of years is required for its completion. The urgency of the forest-survey program was foreseen 20 years before authorization for it was obtained. With the years that need has grown until today it becomes an essential feature in the national effort for economic land use. A large number of agencies are pressing for the information that the forest survey alone can make available.

The increase requested would be used to augment small survey allotments in the Appalachian and Northern Rocky Mountain Regions. The former has high watershed value, includes extensive areas of pine and fine hardwoods, is close to consuming centers, and supports a large number of people to whom a permanent forest resource is a life necessity. The latter embodies social and land-use problems, resulting from the excessive cutting of white pine and an unbalanced condition between growth and depletion for all species, so severe as to endanger the welfare and security of dependent communities. The survey supplies basic information with which to cope with these situations.

WORK UNDER THIS APPROPRIATION

The Forest Survey is specifically authorized by Section 9 of the Act of May 22, 1928 (McNary-McSweeney Forest Research Act). It consists of an authoritative nation-wide inventory of the extent, location, and condition of forest lands; the quantity, kinds, quality, and availability of timber now standing on these lands; the rate of depletion through cutting, fire, insects, disease, and other causes; the current and probable future rate of timber growth and the productive capacity of our forest area; and the present and probable future requirements for forest products in the different parts of the country by all classes of consumers, including many major industries. It also includes analyses of the relation of these findings to one another and to other economic factors as a basis for formulating policies, principles, and plans of forest-land utilization. It involves both field surveys and the compilation of existing data from a great variety of sources.

The Survey is obtaining fundamental information long needed and now vitally essential to the most efficient prosecution of important measures of the Administration dealing with conservation and land use, such as the effectuation of forest conservation and sustained operation of forest industries, the retirement of submarginal land from agricultural use, expanded public acquisition of land for forest purposes, a permanent Civilian Conservation Corps program, the Tennessee Valley development, and the establishment of permanent forest communities. The accumulation and interpretation of data are lagging far behind the demand.

This work is conducted mainly in the regions served by the following forest experiment stations:

Appalachian.--This region of 75 million acres, stretching from the Coastal Plain to the highest reaches of the Appalachians and including extensive areas of pine and some of the finest hardwoods in the country, is one of our most important timber areas. Less is known of the economic significance and the potentialities of the Appalachian forest than of any other important forest region. In accordance with previous commitments, field work on a small scale has commenced.

California.--Limited Federal funds have restricted the work to the preparation of a forest-cover type map. The other phases of the Survey will follow as rapidly as funds become available.

Lake States.--The project in this region involves the coverage of nearly 60,000,000 acres of forest land in cooperation with the States of Michigan, Wisconsin, and Minnesota, which have already contributed a great deal of their own effort to the project. The work is well advanced but incomplete.

Northern Rocky Mountain.--This region includes the only significant remaining supply of white pine in the United States. Because of the special national as well as the regional importance of the forests in this territory, the Federal Government is spending large sums in their protection against fire and forest diseases. The work is in its early stages.

Pacific Northwest.--For the Douglas-fir belt in western Oregon and Washington, final type maps and numerous preliminary reports have been released. Good progress has been made on the preparation of final reports for "survey units" and for the Douglas fir belt as a whole. For this area, which contains the largest remaining supply of virgin timber and with it the most important and unsatisfactory forest industry situation of any timber region, the Survey is supplying basic information urgently necessary for the development of sustained yield plans for private holdings and for national-forest and other public areas, as well as for the formulation of forest and land-use plans by many public, private, and local agencies. During the year the preparation of final reports and type maps for the Douglas-fir belt will continue. Field inventory in the pine types of eastern Washington and Oregon is under way.

South.--This region includes the entire Southern-pine naval-stores district, the bulk of the Southern-pine lumber-producing stands, and the chief hardwood-producing area of the Nation. With the exception of Texas and Oklahoma, the field inventory work is nearly done. Work is being concentrated on the compilation, analysis, interpretation, and report preparation for the enormous volume of data already collected.

(j) FOREST ECONOMICS

	Regular	Emergency	Total
Appropriation, 1937.....	$91,295	$39,365	$130,660
Budget Estimate, 1938.....	121,295	- - -	121,295
Net change.....	+30,000	-39,365	-9,365

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
1. New public domain:				
Regular funds.....	$16,222	$24,350	$24,350	- - -
Emergency relief funds.....	1,381	1,035	- - -	-$1,035
Total.....	17,603	25,385	24,350	- 1,035
2. Private forestry:				
Regular funds.....	49,278	52,945	67,945	+15,000(1)
Emergency relief funds.....	48,275	36,956	- - -	-36,956
Total.....	97,553	89,901	67,945	-21,956
3. Stumpage, log, and lumber prices:				
Regular funds.....	7,425	14,000	14,000	- - -
Emergency relief funds.....	1,832	1,374	- - -	- 1,374
Total.....	9,257	15,374	14,000	- 1,374
4. Range economics:				
Regular funds.....	- - -	- - -	15,000	+ 15,000(2)
Emergency relief funds.....	- - -	- - -	- - -	- - -
Total.....	- - -	- - -	15,000	+ 15,000
Total obligations:				
Regular funds.....	72,925	91,295	121,295	+ 30,000
Emergency relief funds.....	51,488	39,365	- - -	-39,365
Total.....	124,413	130,660	121,295	- 9,365
Unobligated balance (regular funds).....	370	- - -	- - -	- - -
Total (all funds):				
Regular funds.....	73,295	91,295	121,295	+ 30,000(A)
Emergency relief funds.....	51,488	39,365	- - -	-39,365
Total.....	124,783	130,660	121,295	-9,365

INCREASES

(A) The increase of $30,000 in regular funds for 1938 includes:

(1) An increase of $15,000 for private forestry investigations in the Lake States region. It is planned to use this increase for a study of economic organization in relation to increased yields, income, and rural social benefits to persons dependent on farm woodlands and other small holdings.

The farm woodlands of the Lake States are potentially a very important feature of farm economy. They furnished forest materials valued at $37,000,000 in 1929. With the depletion of virgin timber supplies, wood-using industries are turning more and more to farm woodlands for raw materials, but heavy overcutting is resulting in a steady process of deterioration which is constantly reducing yields and, if continued, will also reduce income. The purpose of this study is to develop simple methods of economic organization that will give farmers the benefit of collective action in forest management and in such utilization and disposal of forest products as will improve the quality and quantity of farm woodland production, insure a steady field for labor and income for the landowner, and increase the effectiveness of farm woodlands as soil protection cover.

(2) An increase of $15,000 for range economics investigations in the Intermountain Region. This sum will be used for a study of the economic factors which are vitally important considerations in the distribution of grazing privileges on the public forest-range lands of this region.

The importance of the range resources of this region and the necessity for their rehabilitation and wise use are being recognized more and more. The purpose of this study will be to determine, for various conditions and combinations of livestock raising and agriculture, what size range unit is best adapted for family economy and how Federal range lands can best be integrated with such units. It is of vital importance in this region that the privilege of range use, particularly of the national-forest ranges, be neither unduly concentrated nor unduly dispersed. It must be distributed in a way that will promote prosperous family units and well-balanced permanent communities. The study will necessarily review the factors underlying economic welfare from the use of range lands in each type of community. It will involve, among other things, an analysis of the economic and social organization and activities of typical communities that are largely dependent on range resources. The results of the study should afford a basis for equitable redistribution of the use of the Federal range in this region, if such redistribution is found to be needed. This investigation will supplement, on the economic side, the program of range research provided for under Section 7 of the McNary-McSweeney Forest Research Act.

WORK UNDER THIS APPROPRIATION

General.--This is a series of studies which, in correlation with other forest research, strike directly at efficient and economical ways of attaining the important forest land-use objectives upon which sound

forest plans, public and private, must be based.

This work is specifically authorized by Section 10 of the Act of May 23, 1928 (McNary-McSweeney Forest Research Act) and is conducted under the following projects:

1. New Public Domain Investigations.--A "new public domain" is being created by the abandonment and reversion to public ownership through tax delinquency of cut-over forest land. This is a study of the extent and trends of reversion in different regions, the feasibility of using the land for forest purposes, the desirable balance of ownership between Federal, State, and other public agencies, and the methods and aims of public administration and use. The investigations are conducted in the following regions:

(a) California.--This State has exceptionally acute and complicated problems of land use, especially in its 40 million acres of foothill area, which constitutes a wide margin of conflicting use between the forested mountains and the agricultural valleys. Excessive overgrazing has long been the rule and has seriously depleted the forage-producing capacity of the grazing lands. Former timber wealth is gone; the livestock industry is in serious straits; agriculture is precarious; population and wealth are declining; communities are in distress; lands are tax-delinquent, and county governments are pinched. Land abuses in the marginal foothill zone further combine with destruction of the forests at higher elevations to accelerate erosion and produce serious disturbances in the annual water crop, upon the integrity of which all other crops in most of California depend. Through readjustments of land use many of these conditions can be ameliorated, and the high costs of local government services, such as roads and education, in sparsely populated areas, can be materially reduced. Fundamental information of first importance in connection with corrective programs of land-use planning will be supplied as a result of land-utilization studies by the California Experiment Station. This study is commencing this fiscal year (1937).

(b) Lake States.--The abandonment of cut-over land has reached a more acute stage in the Lake States than in any other region. At least 20,000,000 acres of land have reverted to public ownership or are suffering under long-term delinquency. This study, prosecuted in cooperation with other Federal, State, and local agencies, is already supplying information and advice of vital importance to the formulation and application of constructive land-utilization plans, including the correlation of agricultural and forest use, the greatly expanded program of Federal acquisition, and the development of State and county forest systems in the Lake States.

(c) Pacific Northwest.--The destructive cutting of privately owned forest land in Oregon and Washington, the serious and increasing extent of tax delinquency, forfeiture, and abandonment of these lands, and the attempts to settle them for agricultural purposes have produced deplorable physical, economic, and social results. The instability of forest-land ownership is increasing; precipitate losses are taking place in the tax base and in tax receipts essential for the maintenance of public services;

and industries and the opportunity for labor are being lost. Added to these factors is the continued and uncontrolled practice of placing settlers on forest lands unsuited for agricultural purposes and remote from established roads, schools, and other advantages of community life, where fire is a hazard to life and property and where their presence adds to the burden of property owners, taxing jurisdictions, and social agencies. No legal control over these practices and no reasonably lasting solution of these problems are possible unless and until local awareness takes place, a delineation between forest and other lands is made, and ways of stabilizing ownership, employment, and social betterment are developed.

(d) South.--The average of forest land forfeited to public ownership through nonpayment of taxes has increased to such an extent during recent years as to constitute a major problem in the fiscal affairs of the several States and their minor divisions and an even greater problem in forest land-use planning.

The analysis of the causes and the determination of the extent of this situation is one of the basic requirements in the development of a sound forest land-use policy. Data already available from this study are in demand by the Agricultural Adjustment Administration State planning boards, State foresters, and other agencies and individuals. These agencies, together with State and local governments, are cooperating.

2. Private Forestry Investigations.--Current work includes a search for ways and means of replacing the customary destructive methods of exploitation by the practice of forestry, including sustained yield management on privately owned lands. This requires appraisal of the economic factors in various forest regions that are obstructing forestry practice and the formulation of new operating methods and other means, including needed public assistance, that will aid in overcoming these obstacles. The work also includes studies of the financial aspects of forestry, especially of the costs and returns from timber growing, to determine for various forest regions where and under what economic conditions forestry may be successfully practiced; and a study of the potential contributions of forestry to community stability and prosperity. These investigations are being conducted mainly in the following regions:

(a) Pacific Northwest.--The Douglas-fir belt includes one-third of our remaining saw timber. Three-fifths is in private ownership and is characterized by destructive utilization practices; cut-over land is often rendered completely unproductive by successive burning; sawmill capacity is far in excess of sustained yield capacity or market requirements. Altogether, it represents the most serious and baffling "sore spot" in the Nation's forest economic situation. This study is furnishing vital information as to practical and profitable means, including revolutionary changes in the mechanics of logging and in methods of cutting, of converting the industry to sustained yield management.

In the ponderosa-pine belt present operating practices are reducing potential rates of annual growth from as high as 200 to as low as 10 to 25 board feet per acre. This study will provide basic information needed in fixing diameter cutting limits, spacing of railroad spurs, skidding distances, and desirable types of machinery; in brief, information necessary

for the elimination of wasteful and uneconomic practices and for the stabilization of lumbering operations, communities, and labor conditions.

(b) South.--Most of the 200 million acres of forest land is privately owned. Because of its enormous potential productive capacity and favorable location, the region is the logical source of timber for much of the eastern United States and for export trade. The forest resource is the basis of the world's largest naval-stores industry. But forest productivity has seriously deteriorated and industry has correspondingly suffered as the result of uneconomic practices. If the forest-products industries are to be rehabilitated, the practice of forestry must be installed on private land and forest productivity must be restored.

An analysis of the cost of growing timber and the returns to be derived therefrom--in other words, the conditions under which private forestry will be practicable--is especially needed. This study is designed to supply this information. The development of private forestry is of the utmost importance, not only from the standpoint of the region itself because of the extent to which local economy must be based upon the forest resource, but to the whole eastern United States.

(c) Northeast.--The purpose of this work is to obtain the technical basis for and to help develop to the point of self-support cooperative timber production, manufacturing, and marketing enterprises, particularly for farmers and other small owners. Unrestricted cutting of timber on farm woodlands, largely prompted by heavy demand from adjacent industrial population, has depleted the available timber to a point where many industries have been forced to move to other regions. Returns to woodland owners from the sale of timber are relatively low and realized only once in several decades. Manufacturing and marketing of forest products is generally on a haphazard and uncertain basis. Specifically, the procedure is to study the possibilities of cooperative management of small timber holdings, particularly farm woodlands, in typical natural units, with the belief that proper forest-management methods will permit a regular and dependable source of increased income to farmers and others. Studies in methods of cutting, transportation, manufacturing, and marketing are also included.

(d) Central.--This new study, commencing during the current fiscal year (1937), has the same general objectives and is being conducted in the same general manner as the Northeast investigations described in the preceding paragraph. A steady demand for timber in the agricultural sections of the Central States provides very favorable opportunities for profitable forestry.

3. Stumpage, Log, and Lumber Price Investigations.--Stumpage and log prices are important elements in the production cost of lumber and other wood products. They are not compiled on a nationwide basis by any other agency. They are necessary in other important economic studies and influence the formulation and development of national, State, and private forest programs and are of value to the industry.

Current work includes the compiling and analyzing of price data for previous years from all available sources; the development of price trends and indexes; the comparison with price trends and indexes of important agricultural crops; the compilation of current price data; and the publication of an annual statistical bulletin. Basic data are collected annually through a cooperative agreement with the Bureau of the Census. Work to date has been confined mainly to stumpage and log prices. Work on lumber prices is as yet fragmentary because of limited facilities and funds. This is an important and continuing project. The work is done mostly in Washington.

4. Range Economic Investigations.--This is a new work project on which no current work is being done. (See justification under increases).

(k) FOREST INFLUENCES

	Regular	Emergency	Total
Appropriation, 1937:			
Investigations.....	$99,152	$95,697	$194,849
Shelterbelt work.....	170,000	729,447	899,447
Total, 1937.....	269,152	825,144	1,094,296
Budget Estimate, 1938:			
Investigations.....	129,152	- - -	129,152
Net change.....	-140,000	-825,144	-965,144

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
A. Investigations:				
1. Forest cover:				
Regular funds.....	$35,782	$32,920	$62,920	+ $30,000(1)
PWA lieu funds.....	4,069	- - -	- - -	- - -
Emergency relief funds	118,457	90,565	- - -	-90,565
Total.....	158,308	123,485	62,920	-60,565
2. Brush and herbaceous cover:				
Regular funds.....	63,290	66,232	66,232	- - -
PWA lieu funds.....	553	- - -	- - -	- - -
Emergency relief funds	6,713	5,132	- - -	-5,132
Total.....	70,556	71,364	66,232	-5,132
Total, Investigations:				
Regular funds.....	99,072	99,152	129,152	+ 30,000(1)
PWA lieu funds.....	4,622	- - -	- - -	- - -
Emergency relief funds	125,170	95,697	- - -	-95,697
Total.....	228,864	194,849	129,152	-65,697
B. Plains shelterbelt project:				
Regular funds.....	- - -	170,000	- - -	-170,000(2)
Emergency relief funds	1,833,664	729,447	- - -	-729,447
Total.....	1,833,664	899,447	- - -	-899,447
Unobligated balance (Investigations - regular funds)..	80	- - -	- - -	- - -
Total, Forest Influences:				
Regular funds.....	(a)99,152	269,152	129,152	-140,000
PWA lieu funds.....	4,622	- - -	- - -	- - -
Emergency relief funds	1,958,834	825,144	- - -	-825,144
Total.....	2,062,608	1,094,296	129,152	-965,144

(a) For 1936, this constitutes an allotment from the $281,362 appropriation for "Soil-Erosion Investigations" carried under the "Miscellaneous" section of the Agricultural Appropriation Act, 1936.

INCREASES AND DECREASES

The net reduction of $140,000 in regular funds under this item for 1938 consists of (a) an increase of $30,000 for forest-influence investigations and (b) a decrease of $170,000 by omission of the item for the liquidation of the Plains Shelterbelt project, as follows:

(1) An increase of $30,000 for forest-cover investigations, to be expended as follows:

(a) $15,000 for determining the effects of Appalachian hardwood forests on floods and stream regularity. Recurrent local floods, with heavy silting of streams and reservoirs, have been accentuated by increasing abandonment of previously cultivated land and increasing areas of timberlands devastated by lumbering and fire. Information as to the part that forests and their treatment play in the local flood situation is badly needed, particularly as these forests occur on steep slopes and on rolling and erosive lands in a region of heavy rains. Increasingly close utilization of timber must be expected and will accentuate the present undesirable situation. Fire will continue to play an important role. The Appalachian region is second only to the Southern region in the forest area burned annually.

(b) $15,000 for investigation of the role of chaparral cover in water production and in flood reduction in southern California. In this region of 2,500,000 people the questions of water supply and floods is one of the most serious in the United States. Ground-water supplies have been steadily overdrawn by excessive pumping for irrigation and domestic uses. Replenishment is threatened by denudation of the mountain areas by fire while increasing run-off and mud-flows have caused floods resulting in large property damage and the loss of human lives. Work which has no counterpart anywhere is now under way with emergency funds on an intensive scale. This experiment has been widely acclaimed by engineers and geologists interested in water problems. The State, County of Los Angeles, and other public and private agencies are contributing to this study, but additional funds are necessary to finance current work and place it on a continuing basis.

(2) A decrease of $170,000 by omission of the item for the maintenance in nurseries of tree stocks and for their distribution to farmers in liquidation of the Plains shelterbelt project. A provision was inserted in the 1937 Appropriation Act making available $170,000 of this appropriation only for the maintenance in nurseries of existing stocks and for the free distribution thereof to farmers, in liquidation of the shelterbelt project of trees or shrubs in the Plains region undertaken heretofore under emergency appropriations. The distribution of this planting stock will take place during the spring of 1937.

CHANGES IN LANGUAGE

The appropriation item for "Forest Influences" is being revised to more adequately describe the work performed. In 1937 the language of the item was patterned after the old "Soil Erosion" item which appeared in the

"Miscellaneous" section of the Appropriation Act. This was done in order to establish the connection between the "Forest Influences" and "Soil Erosion" items.

The language relating to the Plains shelterbelt project has been eliminated.

WORK UNDER THIS APPROPRIATION

General.--The investigational work now in progress under this item falls under the "National Program of Erosion-Streamflow Investigations on Forest and Range Lands", which was first submitted to Congress on January 12, 1931 during the hearings on the Appropriation Bill for 1932. A revised program recently has been submitted to Congress through the Committee of Flood Control. The research under this program is directed to a determination of the effect of forest, brush, or range cover, or of combinations of them, on soil and water. Its purpose is to determine whether such vegetative cover may serve as the major factor in providing satisfactory conditions of water flow and of controlling erosion on entire watersheds or important parts of watersheds; and, if so, whether it must be used in a virgin condition or may be modified by cutting or grazing. It seeks to ascertain how to conserve soil fertility and moisture for the growing of forest and range forage and how to deliver the maximum amounts of usable water for irrigation, municipal use, power, navigation, etc., Its objective is to make waste lands productive, to protect against destructive floods, and to safeguard public and private works - investments which already aggregate hundreds of millions of dollars. In short, it is designed to furnish facts and remedial measures as a basis for action by Federal, State, and other agencies.

Practically every watershed in the United States contains some portion of the 615 million acres of forest land or of the 585 million acres of non-forest range land, or both. The disastrous Mississippi River flood and many other floods of recent years, the rapidly increasing demand for irrigation water throughout the West, and the shortage of municipal water for many cities and towns during drought years greatly accentuate the problem caused by increasing population and have focused attention on both forest and range as related to streamflow regulation and erosion control. These investigations are conducted under the following projects:

1. Investigations of Forest Cover in Relation to Watershed Management.--This activity deals with the effects of forest cover on water supply. It includes studies of the effect of forests on flood and low-water flows, on erosion and other related phenomena, and, in fact, upon the whole water cycle. It supplies some of the framework for national-forest policies and is basic in formulating water-conservation and flood-control policies and programs for forest and other wild lands.

The enormous losses caused by floods, irregular streamflow, scarcity of water, shrinkage of underground reservoirs, and related phenomena have a far-reaching effect upon our national economy. The reduction of such losses on non-arable lands through proper utilization of natural cover and through special measures adaptable to such lands appears both possible and feasible.

Where such losses due to forest fires, destructive logging, smelter fumes, or other causes destructive to the forest cover have reached an advanced stage, remedial measures suitable to local conditions are being worked out. These involve the solution of a number of complex problems, including the development of planting stock suited to impoverished soils and sites and in connection with various forestry engineering measures such as small check dams and water-retarding devices. The design of these measures and devices, and their use and application are being worked out for a variety of conditions.

Finally, this project determines the relation between the cover as it is and as it might be under various conditions of use and conditions of water flow. These studies are basic to management policies on the national forests and other forest lands where water may be and often is of more value for domestic, irrigation, or municipal use than the forest itself. Work is now under way at the Appalachian, California, Southern, and Lake States forest experiment stations.

2. Investigations of Brush and Herbaceous Cover in Relation to Watershed Management.--This work includes studies to determine the relation of brush and herbaceous cover to erosion, streamflow, and groundwater levels; and the effects of grazing and how overgrazed and eroded areas can be reclaimed and their watershed values restored. Depletion of the natural vegetative cover through overgrazing on large parts of the 585 million acres of non-forest range lands has contributed greatly to the irregularity of streamflow, to the silting of streams, reservoirs, and irrigation works, and to the scarcity of water for domestic and irrigation uses. The results of these investigations have been of great value to Federal and State agencies in emergency programs of watershed management. The urgent demand for additional information requires continuation of these studies, which are conducted by the Intermountain, Rocky Mountain, and Southwestern forest and range experiment stations.

(1) FOREST-FIRE COOPERATION

Appropriation Act, 1937.....	$1,655,007
Budget Estimate, 1938.....	1,655,007

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Forest taxation and insurance investigations.....	$44,882	$45,000	$45,000
2. Cooperation with States in forest-fire prevention and suppression..	1,529,881	1,610,007	1,610,007
Unobligated balance.....	3,869	- - -	- - -
Total appropriation.....	1,578,632	1,655,007	1,655,007

CHANGE IN LANGUAGE

The words "not to exceed" have been inserted before the amount limiting expenditures for personal services in the District of Columbia, in order to make it clear that the amount specified is available for other purposes than salaries in the event that the entire amount is found not to be required for personal services in Washington.

WORK UNDER THIS APPROPRIATION

1. Forest Taxation and Insurance Investigations.--This work involves local application studies, in cooperation with State and other agencies, necessary to supplement, adapt, and effect the general conclusions and principles already determined to the widely varying conditions of individual States. Taxation under present methods is generally recognized as one of the greatest obstacles to private forestry practice and a major cause of forest destruction. Interest in forest taxation is widespread on the part of forest owners, State and local authorities, and the agencies concerned with the conservation and development of forest resources. Urgent demand is being made for aggressive Federal assistance in obtaining forest-taxation reform to accomplish the stated objectives of forest conservation and the rehabilitation of the forest-products industries under the recovery measures of the Administration. This demand has been stimulated by the critical tax situation in many forest regions and by the growing opinion that reform in taxation is vitally needed if the standards of private forestry practice are to be substantially improved.

This project also includes the investigations of principles of, and the feasibility of developing, a system of forest-fire insurance. Special emphasis is being given to the prosecution of this study because the information being obtained as to damage and risk elements is essential in the development of a sound system of forest credits, itself an important aid to the conversion of private forest enterprises from a destructive liquidation to a sustained production basis. A comprehensive report analyzing the findings and possibilities and presenting constructive suggestions for setting up forest-fire insurance in the Pacific Coast States is in process of publication.

2. Cooperation with States in Forest-Fire Prevention and Suppression.--The Forest Service participates with the individual States in this work under cooperative agreements. These agreements provide for plans of work and budgets by the States, and Federal reimbursement is made to the States only after the work is done and paid for by the State. The Forest Service also provides technical assistance and inspectional service.

Federal participation in this cooperative program was inaugurated in 1912, at which time 60,779,000 acres were covered by a nominal form of organized protection on the part of States and private industries. This area has been progressively increased to 242,000,000 acres in 1935. The Federal Government has assumed leadership in stimulating State, county, and private effort and in effecting unified organizations primarily devoted to the protection of forest lands from fire. Thirty-eight States and the

Territory of Hawaii now participate, and two additional States (Illinois and Missouri) are preparing to enter into cooperation.

The tangible value of this cooperation is evidenced by the fact that during the calendar year 1935 only 0.95 percent (less than 1 percent) of the protected area was burned, as compared with 15 percent of the unprotected area which was burned over. The damage from forest fires on protected forest land during the same period was estimated at $3,856,120, as contrasted with an estimated damage of over $28,300,000 on unprotected forest lands.

The following table shows, by States, the Federal allotments compared with contributions made by States and private agencies for forest-fire cooperative work conducted under the provisions of the Clark-McNary Act.

STATE ALLOTMENT DATA
FOREST-FIRE COOPERATION UNDER SECTION 2 OF THE CLARKE-McNARY LAW

State	Estimated cost of adequately protecting State and private forest land	State and private funds budgeted, fiscal year 1937	Federal allotments	
			Fiscal year 1937	Estimates for 1938 (actual allotments will depend upon State expenditures)
Maine	$342,000	$199,525	$49,160	$48,560
N. H.	131,000	64,973	15,160	15,029
Vermont	57,000	18,340	5,500	5,469
Massachusetts	169,000	95,409	23,530	23,251
Rhode Island	17,000	18,590	2,290	2,264
Connecticut	76,000	66,061	15,770	15,507
New York	378,000	438,698	62,200	61,323
New Jersey	128,000	116,580	22,840	22,499
Pennsylvania	364,000	318,350	46,850	46,360
Delaware	12,000	7,420	1,630	1,609
Maryland	73,000	41,608	11,950	11,784
Virginia	397,000	45,323	31,760	31,760
West Virginia	312,000	143,472	32,290	32,093
Kentucky	212,000	21,860	16,960	16,960
North Carolina	632,000	120,255	51,560	51,530
South Carolina	378,000	115,721	32,720	32,657
Georgia	775,000	185,700	69,620	69,417
Florida	847,000	134,902	70,680	70,601
Alabama	573,000	39,280	36,530	36,530
Mississippi	563,000	69,665	45,040	45,040
Louisiana	434,000	105,504	42,190	41,986
Texas	434,000	107,099	39,560	39,425
Oklahoma	165,000	15,200	13,200	13,200
Arkansas	484,000	69,716	41,460	41,383
Tennessee	245,000	71,544	19,600	19,600
Michigan	662,000	381,853	106,940	105,452
Wisconsin	390,000	302,268	61,960	61,112
Minnesota	697,000	554,891	84,140	83,356
Ohio	60,000	23,580	5,600	5,575
Indiana	84,000	21,795	6,720	6,720
Illinois	77,000	. .	. .	. .
Missouri	347,000	. .	. .	. .
Montana	190,000	76,158	23,500	23,268
Idaho (N)	420,000	180,994	47,180	46,810
Idaho (S)	27,000	25,489	5,670	5,571
South Dakota	4,500	3,920	850	837
New Mexico	26,000	5,994	2,080	2,080
California	969,000	543,787	150,270	148,267
Nevada	13,600	6,358	1,755	1,740
Hawaii	5,173	4,952	994	982
Washington	632,000	537,647	85,720	84,751
Oregon	584,000	321,983	79,413	78,512
Total	13,386,273	5,622,464	1,462,842	1,450,870
Administration and contingent expenses			147,165	159,137
Forest Taxation and Insurance Project			45,000	45,000
Total			1,655,007	1,655,007

(m) COOPERATIVE DISTRIBUTION OF FOREST PLANTING STOCK

Appropriation Act, 1937	$70,579
Budget Estimate, 1938	70,579

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Payments to States for cooperative distribution of forest planting stock . . .	$55,146	$70,579	$70,579
Unobligated balance	1,233	- - -	- - -
Total appropriation . .	56,379	70,579	70,579

WORK UNDER THIS APPROPRIATION

The work under this appropriation consists of cooperation with forty States and two Territories in the procurement and production of forest-tree seeds and plants and their distribution to farmers for the establishment of windbreaks and farm woodlots upon non-forested and submarginal farm lands. The work is directly administered by the cooperating State agencies, with technical assistance and advice, inspection, and correlation by the Forest Service. Federal cooperation is provided to the State agencies by means of reimbursement after the work has been performed and paid for by the State. In excess of twenty-five million trees were distributed during the calendar year 1935 under this cooperation.

Through these cooperative projects the individual States secure Federal assistance in establishing and maintaining tree nurseries and other sources of procurement of forest planting stock, and these facilities are available for participation in tree-planting programs in connection with C.C.C. work, soil and water conservation work, and other tree-planting activities under various work-relief programs. There is increasing realization by farmers of the economic value of farm woodlots as a supplemental source of cash income as well as providing materials for the farm, together with the desirability of tree planting as a means of climatic protection and drought amelioration.

(n) ACQUISITION OF LANDS FOR NATIONAL FORESTS

	Regular	Emergency	Total
Appropriation, 1937	$2,500,000	$292,920	$2,792,920
Budget Estimate, 1938 . . .	2,500,000	- - -	2,500,000
Net change	- - -	-292,920	-292,920

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Decrease
Acquisition of lands for national forests:				
Regular funds	- - -	$2,500,000	$2,500,000	- - -
Emergency relief funds	$13,754,646	292,920	- - -	-$292,920
Total	13,754,646	2,792,920	2,500,000	- 292,920

CHANGES IN LANGUAGE

A revision is recommended in the title of this appropriation from "Acquisition of Lands" to "Acquisition of Lands for National Forests", in order to distinguish it from the new appropriation "Cooperative Acquisition of Lands for State Forests". Corrections have also been made in the statutory references.

WORK UNDER THIS APPROPRIATION

Federal acquisition of forest lands for the protection of the headwaters of navigable streams was inaugurated by the Act approved March 1, 1911. Federal purchases of lands primarily for purposes of timber production were first authorized by the Act of June 7, 1924. Under these two Acts there have been created 88 national-forest purchase units situated in 30 States and in Puerto Rico.

The major objective of this work is to place under permanent Federal ownership and management the areas of forest land upon which the maintenance of optimum conditions of tree growth, timber production, and streamflow stabilization is a matter of national importance and can be accomplished only by Federal action, together with the areas necessary for the administration of such lands. Accomplishment of this purpose entails national and State surveys of forest areas and conditions, the specific determination and definition of the areas for which Federal ownership is dictated, determination of all land ownerships within such areas, and the solicitation of offers of sale to the United States; detailed examinations, estimates, cruises, and appraisals of the offered lands to determine their value; negotiations with the owners thereof to obtain options; preparation of detailed reports for review by executive officers and the National Forest Reservation Commission; survey of lands in the regions not covered by public survey; and prosecution of the routine steps incident to the perfection of titles and the final vesting of the land in Federal ownership. Most of the cost of this work is borne by the special appropriations or allotments made available for land purchase but certain of the costs of administrative review and action properly are chargeable against the general expenses of the Forest Service.

The volume of land-acquisition work accomplished may be measured by the fact that during the fiscal year 1936 there were submitted to and approved by the National Forest Reservation Commission 6,140 cases, involv-

ing 2,891,939 acres of land, valued at $11,601,644; and, additionally, there were in readiness for similar presentation when funds became available 2,850 other cases involving lands valued at $5,200,000. Since not all offers result in acceptable options, the acreage of land cruised, classified, and appraised is materially in excess of the acreage approved for purchase.

(o) COOPERATIVE ACQUISITION OF LANDS FOR STATE FORESTS

Appropriation Act, 1937	- - -
Budget Estimate, 1938	$1,000,000
Increase	1,000,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Cooperative acquisition of lands for State forests .	---	---	$1,000,000	$1,000,000 (1)

INCREASE

(1) This is a new appropriation and is requested to place the Fulmer Act, approved Aug. 29, 1935 (Public 395 - 74th Congress), in an operative status.

The Fulmer Act, unanimously supported by all forestry and related agencies, has for its purpose the organization and building up of a stable, adequate, and effective program of State forest-land management and use. The Act does not authorize the direct grant of Federal funds to the States but provides that the entire amount made available for acquiring State forests shall be loaned to the States under agreements that it will be returned to the Federal Treasury through the periodical refund of 50 percent of the gross proceeds from the lands; the Federal Government holding title to the property until full reimbursement is made by the States.

The Land Planning Committee of the National Resources Committee has recommended that approximately 60,000,000 acres of land suitable to forest cover be acquired by the year 1960 and placed under proper forest management by the States. Unless temporary Federal aid is provided under cooperative regulations, it would require more than 200 years to complete such a program at the average rate at which State forests have been purchased during the past 10-year period.

Public interest in forestry practice and the conservation of the Nation's forest resource is in direct proportion to the area of properly handled public forests in the various States. The leadership of the Federal Forest Service, as contemplated by the Fulmer Act, is essential to securing continuity of purpose in the development of the forest-land resources of the

Nation. The development of properly distributed State forests will vastly improve the economic security of communities largely dependent on the forest industry and will furnish an integrating factor for public and private sustained yield management which is essential to the stabilization of the industry. Proper State leadership and coordination will be vital in building up a wood reserve for industry and in establishing a tax-base investment for perpetuating the States' prosperity.

During the State legislative sessions of 1935, twenty-three States passed laws intended to qualify them to participate in cooperative agreement with the Federal Government under the Fulmer Act. Other States already have the necessary legislation, and it is contemplated that 35 States will immediately apply for such cooperation. On this basis, an average of approximately $28,000 will be available to each State if the $1,000,000 recommended under this item is equally distributed. This would permit an average purchase of 5,600 acres of land per State and would provide the beginning of a forest land-use program of far-reaching benefit to large numbers of people who by force of circumstance are not now permitted to take advantage of the benefits to be derived from national or State forests. In various States suitable tracts have already been examined and selected, with a view to securing those sites which would afford the maximum benefits to the greatest number of people. In making such purchases many important factors of the public welfare will be considered, including social rehabilitation, watershed protection, recreational development and usage, soil and erosion control, employment stabilization, etc.

WORK UNDER THIS APPROPRIATION

The Forest Service will set up the administrative procedure for the cooperative acquisition of lands for State forests and will promulgate the necessary instructions and regulations to provide for the speedy and efficient application of the Fulmer Act. Performance will be in accordance with cooperative agreements entered into by the individual States.

The acquisition of State forests will be consummated under the direct supervision of the Forest Service and the facilities of the Service will be utilized wherever possible. The normal procedure for the acquisition of lands for national forests will be followed in this work. Mapping, examination, surveying, appraisal, and the perfecting of title in the United States are included in the acquisition work to be performed by the Forest Service. All proposed purchases must be submitted to the National Forest Reservation Commission for approval prior to purchase.

The Forest Service will furnish technical advice and assistance, will determine that the cooperating State is adequately prepared to administer, develop, and manage the areas which are acquired, will cooperate in working out mutually satisfactory plans defining forest areas within the States, and will assist in the preparation of standards of forest administration, development, and management to insure maximum feasible utilization for timber production and watershed protection. Except for Federal expenditures for unemployment relief, the individual States will pay the entire future cost of administration, development, and management of the forest areas acquired.

(p) ACQUISITION OF LAND, UINTA AND WASATCH NATIONAL FORESTS, UTAH

Appropriation Act, 1937	$50,000
Budget Estimate, 1938	50,000

PROJECT STATEMENT

Project	1936	1937 (Estimated)	1938 (Estimated)	Increase or decrease
Acquisition of lands in the Uinta and Wasatch National Forests, Utah	---	$47,715	$50,000	+$2,285
Unobligated balance	---	2,285	---	- 2,285
Total appropriation . .	---	50,000	50,000	---

CHANGE IN LANGUAGE

Changes have been made in this appropriation to bring it up to date.

WORK UNDER THIS APPROPRIATION

This appropriation will be used only for the purchase of land. When purchased, the lands will be administered as parts of the Uinta and Wasatch National Forests. The purchase price of the land is to be paid for out of receipts from these two forests.

The land to be purchased is located on the western slope of the Wasatch Range in Utah. The greater part of the virgin timber resources of these lands was used to develop the tributary valley. Subsequent fires destroyed or impaired much of the forest cover and, because of their availability as spring and fall ranges, the lands were very heavily stocked with range and domestic livestock. Due to these three causes, the vegetative cover which once protected the steep slope and held the soil in place very largely has been destroyed. In consequence of these conditions, soil erosion has been greatly accelerated and heavy rainfall frequently results in torrential floods which carry away enormous volumes of soil and debris and cause heavy destruction to property in the adjoining valleys.

Inasmuch as these lands adjoin lands owned by the Federal Government and administered by the Forest Service, the cost of administering and protecting the purchased lands will be small.

(q) PAYMENTS TO STATES AND TERRITORIES, NATIONAL FOREST FUND

Appropriation, 1937	$995,891
Budget Estimate, 1938	1,100,000
Increase	104,109

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Payments to States and Territories from national-forest fund	$816,957	$995,891	$1,100,000	+$104,109 (1)

INCREASE

(1) An additional $104,109 is estimated under this fund for 1938 because of the statutory requirement that 25 percent of national-forest receipts be turned over to the States. It is estimated that the receipts for the fiscal year 1937 will be $4,400,000.

WORK UNDER THIS APPROPRIATION

The law requires that 25 percent of all money received from the national forests during any fiscal year be paid to the States and Territories in which the forests are located. The amount of this appropriation varies each year in direct proportion to national-forest receipts during the previous fiscal year. Increases in this appropriation are offset by additional revenue to the Federal Treasury.

(r) PAYMENTS TO SCHOOL FUNDS, ARIZONA AND NEW MEXICO, NATIONAL FOREST FUND

Appropriation Act, 1937 . . .	$31,685
Budget Estimate, 1938	20,000
Decrease	11,685

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Decrease
Payments to school funds, Arizona and New Mexico, national-forest fund . . .	$20,773	$31,685	$20,000	-$11,685 (1)
Unobligated balance	7,727	---	---	---
Total	28,500	31,685	20,000	- 11,685 (1)

DECREASE

(1) A reduction of $11,685 (from $31,685 to $20,000) is estimated for in this item, since it appears that $20,000 from national-forest receipts funds will be sufficient to comply with the legal requirements hereunder for 1938.

WORK UNDER THIS APPROPRIATION

At the close of each year there is paid to the States of Arizona and New Mexico such proportion of the gross proceeds of all the national forests within those States as the area of land granted to the States for school purposes within the national forests bears to the total area of all national forests within the States. These payments are required by the Act of June 20, 1910 (36 Stat., pp. 562 and 573), which provides "That the grants of Sections two, sixteen, thirty-two and thirty-six to said State, within national forests now existing or proclaimed, shall not vest the title to said section in said State . . . but said granted sections shall be administered as a part of said forests, and at the close of each fiscal year there shall be paid to the Secretary of State, as income for its common-school fund, such proportion of the gross proceeds of all the national forests within said State as the area of lands hereby granted to said State for school purposes which are situated within said forest reserves . . . may bear to the total area of all the national forests within said State . . . the amount necessary for such payments being appropriated and made available annually from any money in the Treasury not otherwise appropriated".

(s) ROADS AND TRAILS FOR STATES, NATIONAL FOREST FUND

Appropriation Act, 1937 . . .	$350,000
Budget Estimate, 1938	400,000
Increase	50,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Roads and trails for States, national-forest fund . . .	$366,059	$350,000	$400,000	+$50,000 (1)
Expended from prior year appropriations	-38,059	- - -	- - -	- - -
Total appropriations .	328,000	350,000	400,000	+ 50,000 (1)

INCREASE

(1) An additional $50,000 is estimated under this fund for 1938 because of the statutory requirement that 10 percent of national-forest receipts be expended for the construction and maintenance of roads and trails in the States in which the national forests are located.

WORK UNDER THIS APPROPRIATION

An additional 10 per centum of all moneys received from the national forests during each fiscal year is available at the end thereof to be expended by the Secretary of Agriculture for the construction and maintenance of roads and trails within the national forests in the States from which such proceeds are derived. (U.S.C., title 16, sec. 501).

(t) COOPERATIVE WORK, FOREST SERVICE

Appropriation Act, 1937 . . .	$2,000,000
Budget Estimate, 1938	1,000,000
Decrease	1,000,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Decrease
1. Construction of improvements	$165,609	$1,340,000	$340,000	-$1,000,000 (1)
2. Maintenance of improvements	69,877	80,000	80,000	---
3. Prevention and suppression of forest fires	331,206	400,000	400,000	---
4. Brush and other debris disposal from timber-sale operations	84,662	100,000	100,000	---
5. Forest investigations for other agencies	41,603	50,000	50,000	---
6. Administration of privately-owned lands	7,293	10,000	10,000	---
7. Reforestation	9,106	10,000	10,000	---
8. Refunds to cooperators . . .	6,235	10,000	10,000	---
Total appropriation . .	715,591	2,000,000	1,000,000	-1,000,000 (1)

DECREASE

(1) A reduction of $1,000,000 is submitted under this fund for the fiscal year 1938. The amount appearing in the Budget for this item is an estimate of expenditures in the ensuing year. While in former years the expenditures consistently ran in the neighborhood of $2,000,000, more recently they have fallen below $1,000,000. Inasmuch as these are estimated figures and recent experience indicates that contributions received during the fiscal year 1938 will approximate $1,000,000, this amount has been inserted in the Budget.

WORK UNDER THIS APPROPRIATION

Contributions are made to the Forest Service by individuals, communities, and associations for improvement work, fire control, forest investigations, slash disposal of timber-sale areas, and administration of privately-owned land within national-forest boundaries and are deposited to this fund. Expenditures are controlled by the Forest Service.

EMERGENCY FUNDS

(1) Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
1. Public Works Allotments (National Industrial Recovery Act):		
Permanent fire breaks	$16,151	$10,257
Lookout houses, towers, and observatories	7,821	--
Telephone lines for fire protection	13,282	--
Range fences, driveways, and bridges; water development for stock	30,829	--
Public campground improvement	11,804	--
Dwellings, barns, and offices at isolated stations	16,989	--
Miscellaneous construction, including fences and water development for administrative and research uses, landing fields, and small buildings	14,026	--
Eradication of poisonous plants from national-forest ranges	3,291	--
White-pine blister rust control	19,486	--
Control of tree-destroying insects	4,744	--
Timber stand improvement	33,825	--
Planting and tree nurseries	5,821	--
Construction of buildings requiring legislation	11,793	--
Estimating timber resources	3,068	--
Revegetation of forest ranges	1,492	--
Erosion control	6,729	--
Improvement of forest waters for fish protection	3,292	--
Range surveys	1,528	--
Boundary surveys	873	--
Surveys needed for forest activities, not including topographic quadrangles or General Land Office cadastral surveys	6,297	--
Research:		
Forest management	1,723	--
Range investigation	922	--
Forest survey	2,887	--
Sub-total	218,673	10,257

Projects	Obligated, 1936	Estimated obligations, 1937
Public Works Allotments (National Industrial Recovery Act)--Continued.		
Add amount used to supplement regular appropriations for:		
General administrative expenses	$341	--
National-forest administration	1,785	--
Aerial fire control	3,582	--
Classification of lands	697	--
Sanitation and fire prevention	5,919	--
Planting on national forests	33,931	$2,381
Reconnaissance	8,421	482
Improvements on national forests	28,071	--
Forest survey	12,915	--
Soil-erosion investigations	4,622	--
Total supplementing regular funds	100,284	2,863
Total, Public Works Allotment (N.I.R.)	318,957	13,120

Projects	Obligated, 1936	Estimated obligations, 1937
2. Emergency Relief Appropriation Act of 1935:		
(a) Administrative expenses in connection with miscellaneous forestry projects	$1,541,809	$202,311
(b) Miscellaneous forestry activities, including:		
National-forest improvements, etc.	8,633,481	773,451
Acquisition of additional forest lands	2,313,707	218,443
Plains shelterbelt project	1,646,011	--
Forest research	829,177	142,355
Total, miscellaneous forestry activities (item b)	13,422,376	1,134,249
(c) Administrative expenses incident to acquisition of forest lands	84,440	5,976
(d) Acquisition of additional forest lands	11,125,000	--
Total, Emergency Relief, 1935	26,173,625	1,342,536

(b) The foregoing $14,556,625 for miscellaneous forestry projects, fiscal years 1936 and 1937, has been allocated by States, Puerto Rico, and the District of Columbia as follows:

States, etc.	Allotments
Alabama	$263,970
Alaska	58,670
Arizona	366,330
Arkansas	506,030
California	1,454,551
Colorado	510,100
Connecticut	7,370
District of Columbia	28,100
Florida	46,539
Georgia	303,861
Idaho	1,477,002
Illinois	147,301
Indiana	95,405
Iowa	85,714
Kansas	359,065
Kentucky	223,102
Louisiana	63,141
Maine	6,332
Maryland	2,718
Massachusetts	2,880
Michigan	547,795
Minnesota	368,070
Mississippi	94,355
Missouri	425,005
Montana	789,532
Nebraska	365,915
Nevada	79,885
New Hampshire	178,474
New Jersey	1,110
New Mexico	355,529
New York	4,949
North Carolina	484,196
North Dakota	403,279
Ohio	176,806
Oklahoma	211,721
Oregon	721,573
Pennsylvania	186,607
Puerto Rico	8,032
South Carolina	126,305
South Dakota	386,990
Tennessee	218,644
Texas	273,273
Utah	343,731
Vermont	31,784
Virginia	287,596
Washington	667,194
West Virginia	196,942
Wisconsin	431,437
Wyoming	181,715
Total	14,556,625

(d) The $11,125,000 for acquisition of additional forest lands is being used in conformity with the provisions of the Act of March 1, 1911, as amended (U.S.C., title 16, secs. 513-519, 521), and has been allocated by States and to Puerto Rico as follows:

States, etc.	Allotments
Alabama	$373,113
Arkansas	403,299
California	524,761
Florida	212,343
Georgia	411,511
Illinois	222,616
Indiana	292,667
Kentucky	271,227
Louisiana	372,255
Maine	103,117
Michigan	1,445,775
Minnesota	829,564
Mississippi	964,243
Missouri	519,313
New Hampshire	33,691
North Carolina	1,133,170
North Dakota	4,796
Ohio	234,842
Oklahoma	11,860
Pennsylvania	20,105
Puerto Rico	44,427
South Carolina	631,744
Tennessee	31,935
Texas	100,743
Utah	63,104
Vermont	115,244
Virginia	977,135
West Virginia	473,511
Wisconsin	302,889
Total	11,125,000

WORK UNDER DIRECT EMERGENCY ALLOTMENTS

These allotments are used for such projects as the construction and maintenance of firebreaks, forest-fire lookout houses, towers and observatories, landing fields, telephone lines, forest roads and trails, housing for forest officers, miscellaneous buildings and structures, planting, maintenance of tree nurseries, thinning of forest stands, fire prevention and control, fire-hazard reduction, construction and maintenance of improvements for recreational use of the forests, control of tree-destroying insects and diseases and of range-destroying rodents, eradication of poisonous range plants and revegetation of depleted ranges, construction and maintenance of range fences and other range improvements; surveys of forest resources such as timber, forage, water, wildlife, and related activities; surveys needed

for forest activities, power-resource evaluation and appraisal, development of the fish and game resources; studies relating to forest, range, and watershed management, protection, development, and utilization; acquisition of lands (from 1935 funds - not permissible under allocation from 1936 funds); and for other work and the purchase of equipment and supplies incident to or necessary in connection with any projects of the character indicated above.

Projects	Estimated obligations, 1937
3. Emergency Relief Appropriation Act of 1936:	
(a) Administrative expenses in connection with miscellaneous forestry projects	$310,000
(b) For development of public camping grounds	1,398,000
(c) For conservation of forest resources	7,818,200
(d) For surveys, examinations, and investigations ...	929,800
Total Emergency Relief, 1936	10,456,000

(b) (c) (d) The foregoing $10,146,000 of "project" funds (i.e., exclusive of amount for administrative expenses) has been allocated by States, Puerto Rico, and the District of Columbia as follows:

States, etc.	Allotments
Alabama	$59,723
Alaska	31,800
Arizona	597,569
Arkansas	203,521
California	1,051,998
Colorado	604,850
Connecticut	3,972
District of Columbia	11,916
Florida	67,216
Georgia	148,896
Idaho	954,124
Illinois	46,340
Indiana	40,162
Iowa	29,349
Kansas	108,560
Kentucky	82,346
Louisiana	59,084
Maine	8,605
Maryland	6,064
Massachusetts	3,972
Michigan	193,168
Minnesota	223,677
Mississippi	29,439
Missouri	468,764
Montana	571,683

States, etc.	Allotments
Nebraska	148,521
Nevada	143,956
New Hampshire	122,253
New Jersey	2,698
New Mexico	433,833
New York	2,868
North Carolina	151,620
North Dakota	113,408
Ohio	52,077
Oklahoma	134,205
Oregon	562,854
Pennsylvania	221,720
Puerto Rico	10,720
South Carolina	32,842
South Dakota	218,249
Tennessee	88,827
Texas	116,566
Utah	469,882
Vermont	45,634
Virginia	144,406
Washington	537,837
West Virginia	118,328
Wisconsin	389,257
Wyoming	276,635
Total	10,146,000

	Estimated obligations, 1937
4. Conservation and Use of Agricultural Land Resources, Department of Agriculture (Forest Service): For examination of privately-owned range land in connection with range conservation program	$172,500

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(2) Indirect Allotments
(Projects financed through other Government agencies)

Emergency Conservation Work (authorized by Acts of March 31, 1933 and April 8, 1935; allotment through War Department):

	1936	1937 (estimated)
1. Emergency Conservation Work on National Forests (includes a small number of miscellaneous camps)	$33,956,214	$18,615,350

The number of camps on national forests on July 1, 1935, and July 1, 1936 (all camps on national forests unless otherwise indicated) were:

	July 1, 1935	July 1, 1936
Alabama	6	5
Tennessee Valley Authority	8	5
Arizona	19	13
Arkansas	24	14
California	58	48
Colorado	12	11
Florida	12	7
Georgia	12	10
Idaho	64	30
Illinois	12	8
Indiana	5	3
Iowa	1	-
Kentucky	10	8
Louisiana	7	8
Maine	2	1
Michigan	51	43
Minnesota	37	27
Mississippi	22	17
Missouri	22	12
Montana	19	12
Nebraska	1	1
Nevada	3	3
Navy	2	2
New Hampshire	12	10
New Mexico	14	8
North Carolina	23	17
Tennessee Valley Authority	3	2
Ohio	9	4
Oklahoma	4	1
Oregon	26	17
Oregon and California R.R. lands	4	3
Pennsylvania	14	8
South Carolina	10	8
South Dakota	17	11
Tennessee	15	12
Tennessee Valley Authority	23	16
Texas	14	9
Utah	17	12
Vermont	4	4
Virginia	15	13
Tennessee Valley Authority	4	3
Washington	23	18
Navy	1	1
West Virginia	16	13
Wisconsin	33	26
Wyoming	9	9
Total camps	719	513

Total, national-forest camps	674	481
Total, Navy camps	3	3
Total, Oregon and California R.R. land camps	4	3
Total Tennessee Valley Authority camps	38	26
Total	719	513

WORK UNDER THIS ALLOTMENT

This allotment is used for the pay of supervisory and facilitating personnel necessary for the field work done from E.C.W. camps mainly on the national forests; also for the purchase of necessary equipment and construction materials and for miscellaneous expenses incident to the field work of the camps. The field work on the national forests includes the construction of physical improvements needed for the protection and administration of the forests, tree planting, thinning of young stands of timber, destruction of undesirable timber species, rodent control, etc.

	1936	1937 (estimated)
2. Emergency Conservation Work in Alaska	$466,382	$299,000

WORK UNDER THIS ALLOTMENT

This allotment (Alaska) is used for pay and allowances to dependents of enrolled members of the Civilian Conservation Corps and for salaries and wages of extra supervisory and clerical personnel needed in connection with the work. It is also used for the purchase of clothing, subsistence, supplies, and camp equipment required for enrolled men of the corps and for the purchase of construction materials used in the work. Classes of work done under this allotment include construction of trails, minor roads, bridges, water development and improvement, and miscellaneous administrative improvements; roadside clearings and public campground improvement; estimating timber resources; and other miscellaneous work. The men engaged in the work are recruited from the unemployed local residents without regard to age.

	1936	1937 (estimated)
3. Emergency Conservation Work on State, Municipal, and Privately Owned Land ...	$21,022,539	$13,088,000

Number of camps by States on July 1, 1935 and July 1, 1936:

	July 1, 1935	July 1, 1936
Alabama	5	4
Arkansas	13	7
California	14	10
Colorado	1	-
Connecticut	22	16

	July 1, 1935	July 1, 1936
Delaware	4	5
Florida	14	10
Georgia	19	12
Idaho	10	6
Illinois	-	1
Indiana	19	12
Iowa	3	1
Kansas	2	2
Kentucky	13	9
Louisiana	18	11
Maine	11	9
Maryland	14	16
Massachusetts	35	21
Michigan	29	22
Minnesota	28	14
Mississippi	5	3
Missouri	5	3
Montana	2	1
New Hampshire	8	6
New Jersey	24	22
New York	62	49
North Carolina	13	7
Ohio	13	10
Oklahoma	4	2
Oregon	6	9
Pennsylvania	94	75
Rhode Island	6	4
South Carolina	15	8
South Dakota	1	1
Tennessee	9	6
Texas	13	8
Vermont	15	12
Virginia	27	24
Washington	9	8
West Virginia	20	14
Wisconsin	23	19
Total camps on State lands	648	479

WORK UNDER THIS ALLOTMENT

This allotment is used for the payment of expenses incurred by States in the conduct of Emergency Conservation Work on State, municipal, and privately owned lands, including the purchase of supplies, materials, and equipment used in the work, for payment of salaries and wages of supervisory personnel directing the work of the enrolled men, and for other necessary expenses incident to the work.

The work being accomplished under this allotment includes the protection of State and private forest land from fire by construction of firebreaks, lookout towers, communication systems, truck trails, tool sheds, guard houses, and the fighting of forest fires; protection of State and privately owned forests from the epidemic spread of forest insects and tree

diseases; forest cultural measures to improve the forest growth on State-owned land; and the construction of simple dams and the planting of trees, grass, etc., for the control of erosion and flash run-off at the headwaters of streams.

	1936	1937 (estimated)
4. Emergency Conservation Work in Puerto Rico	$954,602	$748,750

WORK UNDER THIS ALLOTMENT

This allotment (Puerto Rico) is used for the payment of authorized enrollees and the supervisory personnel engaged in the technical direction of the work projects on the Luquillo National Forest and the insular forests, and for the purchase of equipment and supplies incident to the work.

The work projects comprise the construction and maintenance of roads and trails, production of nursery stock, making new and thinning old forest plantations, forest thinnings to improve the timber stands within the national and insular forests, and development of a recreational area within the national forest. With a population of 1,500,000, the unemployment situation in Puerto Rico has been acute and, since the enrollment of the 1,200 men has been on a pro rata basis from the 72 insular municipalities, the E.C.W. work has played its part in giving a measure of relief. Camps are not established as they are in the States, since a large proportion of the enrollees live at home and go to and from the work projects.

EMERGENCY FUNDS - BUREAU TOTAL

Summary

Projects	Obligated, 1936	Estimated obligations, 1937
(1) Direct Allotments:		
Public Works Allotments (National Industrial Recovery Act):		
Physical improvements, control of tree-destroying insects and diseases, forest research, etc.....	$218,673	$10,257
Amounts supplementing regular appropriations	100,284	2,863
Total, P.W.A.	318,957	13,120

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EMERGENCY FUNDS - BUREAU TOTAL

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Amounts supplementing regular appropriations	100,284	2,863
Total, P.W.A.	318,957	13,120

Projects	Obligated, 1936	Estimated obligations, 1937
(1) Direct Allotments--Continued.		
Emergency Relief Appropriation Act of 1935:		
Miscellaneous forestry activities and administrative expenses incident thereto	$14,964,185	$1,336,560
Acquisition of forest lands including administrative expenses	11,209,440	5,976
Emergency Relief Appropriation Act of 1936:		
Development of camp grounds, conservation of Forest Resources, survey, examinations, investigations and administrative expenses incident thereto	- - -	10,456,000
Total Emergency Relief (1935 and 1936)	26,173,625	11,798,536
Conservation and Use of Agricultural Land Resources:		
Range conservation program	- - -	172,500
Total, Direct Allotments	26,492,582	11,984,156
(2) Indirect Allotments (Emergency Conservation Work, financed by War Department):		
Activities of Civilian Conservation Corps:		
National forests (and miscellaneous)	33,956,214	18,615,350
Alaska	466,382	299,000
State, municipal, and privately owned lands	21,022,539	13,088,000
Puerto Rico	954,602	748,750
Total, Indirect Allotments (ECW)	56,399,737	32,751,100
Total, All Emergency Funds	82,892,319	44,735,256

PASSENGER-CARRYING VEHICLES

The authorization for the purchase of passenger-carrying vehicles for the Forest Service from the appropriation "Salaries and Expenses" contemplates an increase of $18,087 ($50,000 in 1937, $68,087 estimated for 1938) for this purpose. This $68,087 will permit the needed replacement of 84 vehicles, at a net average cost of $566 when exchange allowances are taken into account, and the purchase of 28 additional vehicles, at an average cost of $734.

Of these 28 additional vehicles, 12 will be used at the Appalachian Forest Experiment Station in programs of work in the survey of forest resources and for studies of forest cover in relation to watershed management which will be financed in large part by increases requested in these estimates. Two will be needed at the Allegheny Forest Experiment Station, one of which will replace a truck now used by members of the staff which has accommodation for only two persons and must sometimes make two or three trips to transport all the men engaged on a single project; the second car is to be used on the newly created experimental forests at the National Agricultural Research Center at Beltsville, Maryland, in studies in forest management. Two additional vehicles are desired at the Central States Experiment Station to replace trucks which are now used to transport employees to field projects. Their use will result in a reduction in travel time as well as a saving in operating expenses. One additional car will be used at the Pacific Northwest Experiment Station to transport additional personnel engaged in forest-fire studies. Eleven additional vehicles will be used in the protection and administration of the National Forests. The increases sought in this item for 1938, if approved, will necessitate the employment of additional personnel for field work, and more vehicles should be furnished to transport them to their fields of activity.

It is estimated that the average performance of the cars to be replaced, as of June 30, 1937, will be more than 52,000 miles, and this mileage will be appreciably increased before they are actually turned in.

In the appropriation "Forest Roads and Trails" for the fiscal year 1938 a decrease of $7,265 ($15,068 in 1937, $7,803 in 1938) for passenger-carrying vehicles is recommended. All of the 14 vehicles which it is expected will be purchased from this authorization are needed for replacement of vehicles now in use, at a net average cost of $557. The average mileage of the cars to be replaced, as of June 30, 1937, will be over 60,000. They are required for use in the inspection of road construction and maintenance projects on the various national forests.

BUREAU OF CHEMISTRY AND SOILS

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act, 1937..... $90,241
Budget Estimate, 1938..... 90,241

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
General administration and business service.....	$89,859	$90,241	$90,241
Unobligated balance.....	382	- - -	- - -
Total appropriation.....	90,241	90,241	90,241

WORK UNDER THIS APPROPRIATION

This appropriation provides for the salaries and expenses of the office of the Chief of Bureau and the business organization units such as accounting, personnel, editorial, supplies, etc. It is for the purpose of maintaining general administration and direction of the Bureau.

(b) AGRICULTURAL CHEMICAL INVESTIGATIONS

Appropriation Act, 1937	$360,260
Budget Estimate, 1938.....	360,260

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Cereals, fruits, and vegetables investigations.....	$166,041	$161,126	$161,126
2. Sugars, starches, and fats investigations.....	73,805	80,084	80,084
3. Protein and vitamin investigations.....	26,921	28,451	28,451
4. Fundamental investigations in chemistry, microbiology, and pharmacology relating to agricultural products...	61,531	70,599	70,599
5. Chemical weed eradication investigations.....	19,880	20,000	20,000
Unobligated balance.....	2,082	- - -	- - -
Total appropriation.....	350,260	360,260	360,260

WORK UNDER THIS APPROPRIATION

General.--The agricultural chemical and technological research provided for under this appropriation is directed toward the objectives of (1) widening the markets for farm products through the development of more extensive uses, chiefly for food and feed purposes; (2) improvement in quality and better adaptation of products to market requirements; (3) discovery of uses for the constituents of hitherto unutilized plants and new uses for minor crops which will lead to the substitution of these for overproduced crops; (4) development and substitution of domestic for imported agricultural products; and (5) reduction of losses from spoilage and deterioration of food and other agricultural products. This work involves fundamental research on the chemical nature of the numerous organic and inorganic constituents of agricultural products, and technological application of the knowledge thus acquired to the solution of practical problems of utilization. Investigations are conducted on the chemistry, technology, processing, and utilization of cereals, fruits, and vegetables, carbohydrate crops and products (sugars, starches, and miscellaneous carbohydrates), oils, fats, waxes, and on proteins and vitamins. Fundamental investigations involving chemical, biochemical, microscopic, and microbial studies are conducted on foodstuffs in all phases of their evolution from food plants and

raw materials to the finished manufactured products. Studies are also being conducted on problems dealing with the production and use of chemicals for the control of noxious weeds.

1. Cereals, Fruits, and Vegetables Investigations.--Work under this project is directed toward increasing the efficiency of recognized methods and developing new methods in the processing and preservation of food products, in the prevention of spoilage, and in the utilization of culls, surpluses, and wastes for the manufacture of food and other products. Cereal investigations include the study of problems in milling, baking, and malting, with special reference to improving quality of cereal products and the reduction of large losses from spoilage such as is caused by staling and rancidity. Fruit and vegetable investigations are concerned with the various types of food preservation, economical utilization of culls and crop surpluses, and the development of valuable byproducts. The portion of the fruit crop graded as culls often constitutes from 20 to 30 percent of the total crop and represents that much loss unless methods of profitable utilization are developed. In years of overproduction the disposal of surplus products in the form of byproducts also acts to stabilize the fresh market. One of the present problems of outstanding importance to the fruit industry is the satisfactory preservation of fruit juices, both fermented and unfermented. The type of fruit suitable for juice extraction is not suitable for direct sale, yet is highly palatable and of great dietary and commercial value. Of similar importance is the preservation of pulp fruit by freezing. Investigations are also conducted to improve processes for making pickles, vinegar, and allied products. Foods and food products with a value of more than $3,000,000,000 come within the field served by this project. It is the aim of the work to increase this valuation by expanding the processing of farm products, thereby extending the market for raw materials and adding to the farm price.

2. Sugars, Starches, and Fats Investigations.--This work consists of chemical and technological investigations on the carbohydrate constituents (sugars, starches, etc.) of crops and derived farm products (such as sugarcane, sugar beets, honey, maple products, farm-made sugarcane and sorghum sirups, potatoes and other starchy crops, and plants containing miscellaneous carbohydrates) and on fats, oils, and waxes. Carbohydrates comprise about 80 percent of the dry matter of plants and are the primary constituents of most crops. Fats, oils, and waxes represent a value to the people of the United States of over $2,000,000,000 annually. The object of this work is to increase farm income (1) by originating new and diversified uses for carbohydrate constituents from present crops; (2) by devising measures to insure more uniform quality and better adaptation to market requirements; (3) by finding new uses whereby utilization of minor crops may be increased; and (4) by originating uses whereby new crops valuable for diversification may be developed. An example of this work is the recent development of a process for production of high-grade starch from sweetpotatoes, which is resulting in establishing a new industry in the South to supply requirements now met by the importation of over 300,000,000 pounds of starch annually. This industry will provide profitable utilization for a large area of agricultural land in the South which is marginal for cotton and will add a new cash crop well suited to serve as a weather insurance for cotton. Another example is the development of methods for producing farm-made sugarcane and

sorghum sirups of uniform quality, thereby improving the market for these products. This is resulting in the erection of farm cooperative sirup mills and blending and packing plants.

3. Protein and Vitamin Investigations.--Under this project chemical and biological investigations are made of the nutritive value of foods and feeds, with particular reference to their protein and vitamin content, two of the most highly important elements in human and animal nutrition. Proteins differ greatly in their food value. They are complex compounds made up of over 20 constituents called amino acids. The nutritive value of a protein depends chiefly on its composition with respect to these amino acids. Digestibility of a protein depends on its structure. Exact information on the amino-acid composition of proteins is meager and fragmentary. The investigations being conducted include isolation of the proteins from raw materials; determination of their properties, composition, and digestibility; and studies on methods of analysis of proteins and their constituent amino acids. Extension of our knowledge of the chemistry of proteins is important to the farmer as it gives him the basis for the most efficient feeding of farm animals and for the economic utilization of his crops. It is also essential for a determination of the use of proper human diet to maintain health and efficiency; for the right curative and preventive treatment of those suffering from allergic disturbances; for the development of technological uses of proteins in industry; and for advancement in the fields of enzymes, serums, antitoxins, and immunization. Investigations of vitamins include a study of methods and technique of vitamin assay and studies of the effects upon vitamins of certain commercial processes used in the manufacture of food products.

4. Fundamental Investigations in Chemistry, Microbiology, and Pharmacology Relating to Agricultural Products.--This project involves chemical, biochemical, microscopic, and microbial studies of foodstuffs in all phases of their evolution to finished manufactured products. It is the purpose of this work to conduct specific fundamental studies which, because of their nature, can not be undertaken by either the individual food manufacturers or food organizations. Among the more important lines of work being conducted are the following: Research on the microbial spoilage of preserved foods--a phenomenon of widespread occurrence and of special importance now because of the rapid development of new processes for preserving foods; determination of the toxic effects which may result from consumption of foods contaminated with sprays and fumigants; prevention of rancidity in oil-bearing foods; isolation and identification of special constituents of plants and plant products that appear to be of special value in nutrition or in the arts--for example, the ursolic acid of apple pomace and other fruit waste; studies of the color formation of apples and the deterioration of color in tomatoes--factors having an important bearing on the value of the products; and research on the nature of various enzyme actions and their relation to growth, spoilage, curing, and preservation of agricultural products. A proper understanding of the factors responsible for the biochemical changes in food plants and products is essential in preventing losses occurring in the growing, handling, storing, processing, and consumption of farm products and also has direct application in the improvement of processes which will enhance the quality and edibility of these products, with resultant increase in their use and in the returns to the farmers.

5. Chemical Weed Eradication Investigations.--Work done under this project is directed toward the development of chemical means for the elimination of the bindweed and other noxious weeds. Weeds cost the American farmer serious loss annually, through reduction of crop yields and quality and through increased cost of farm operations. Present investigations include (1) a study of the economics and methods of manufacture of recognized chemical agents for the eradication of noxious weeds, with a view to reducing the cost of these chemical agents to the farmer; and (2) the preparation of new chemicals suitable for use as herbicides. All work under this project is done in cooperation with the Bureau of Plant Industry.

(c) INDUSTRIAL UTILIZATION OF FARM PRODUCTS AND BYPRODUCTS

Appropriation Act, 1937.....	$171,243
Budget Estimate, 1938.....	221,000
Increase.....	+ 49,757

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Industrial Utilization of Farm Products and Byproducts:				
(a) Hides and skins investigations...	$9,600	$12,517	$12,517	- - -
(b) Tanning materials and tanning processes investigations.....	9,403	16,700	16,700	- - -
(c) Leather investigations.....	7,331	7,816	7,816	- - -
(d) Cotton fabrics investigations.....	10,000	- - -	- - -	- - -
(e) Wastes investigations.....	23,152	35,968	50,725	+$14,757(1)
(f) Fast dye investigations.....	17,600	- - -	- - -	- - -
(g) Biological stain investigations...	6,991	6,384	6,384	- - -
(h) Fermentation investigations.....	49,157	61,425	76,425	+ 15,000(2)
(i) Lignin investigations.....	9,400	9,400	9,400	- - -

Project	1936	1937 (Estimated)	1938 (Estimated)	Increase
(j) Chemical conversion of oils, fats and waxes.	$3,000	$20,033	$20,033	- - -
(k) Plastics investigations.....	- - -	1,000	21,000	+$20,000(3)
Unobligated balance.....	609	- - -	- - -	- - -
Total appropriation.....	146,243	171,243	221,000	+ 49,757

INCREASES

The increase of $49,757 in this item for 1938 consists of:

(1) An increase of $14,757 for extending research work in the more general utilization of agricultural byproducts such as cereal straws, corn stalks, corn cobs, pulps from various sources, etc. Approximately 260,000,000 tons of these byproducts are produced annually on American farms. With research showing the way, much of this enormous tonnage can be converted into pressboard, paper pulp, and industrial cellulose. There is at present a great demand for pressboard, both in construction and insulation work, and the market is growing rapidly. Numerous grades of paper are made from pulp as a raw material, increasing amounts of which are being imported due to the dwindling available domestic supplies. There are at present great demands for industrial cellulose in the manufacture of rayon, automobile lacquers, motion-picture films, explosives, and cellophane, as well as for many other articles essential to our present-day life. There are potential manufacturing markets available for these products amounting to more than $100,000,000 annually. The Bureau's recent research on the production of high-grade alpha cellulose from sugarcane bagasse, at costs much below any other alpha cellulose of similar quality, has yielded gratifying results. With the additional equipment and personnel which the recommended increase will make available, greater progress can be made in developing the more adequate utilization of other agricultural wastes for such purposes as the production of paper pulp, pressboard, industrial cellulose, and other intermediate or finished products, thereby obtaining for the producers of these byproducts and wastes a strengthened economic position.

(2) An increase of $15,000 for research in the production of alcohol or other fuel from various agricultural crops, surpluses, or culls; and to develop new uses for alcohol or other fuel derived from such sources. The utilization of alcohol for technical purposes is associated with the comparatively recent development of synthetic organic chemistry. At present, however, the alcohol for such industrial purposes is obtained either by the fermentation of sugarcane molasses or from ethylene. To markedly increase the consumption of alcohol derived from domestic farm crops it is essential that cheap raw materials be made available and that uses which intimately touch the every-day existence of mankind be found and developed. For instance, the incorporation of alcohol with gasoline

as a motor fuel offers great possibilities, not only of utilizing farm products on a gigantic scale, but also of extending the acreage devoted to the production of such carbohydrate crops as corn, potatoes, and artichokes. It would also appear highly desirable to investigate the possibility of preparing denaturants from farm materials by chemical or biochemical methods or to use any residues from and at the alcohol plant so as to simplify the denaturing problem and effect important economies in manufacture.

(3) An increase of $20,000 for studies in the production of plastics from agricultural raw materials, including starches, sugars, oils, and other farm products and byproducts. The use of synthetic resins in industry has increased very rapidly in recent years, from a total of 2,000 tons in 1920 to over 31,000 tons in 1934. Some of the principal uses are for varnishes and lacquers, molded articles, adhesives, fabric impregnated materials, ply-woods, and countless new articles of commerce. It is becoming apparent that the future of many American industries will to a large extent become dependent for raw materials on farm crops, rather than on the diminishing supply of mineral resources. The trend in the production of plastics must inevitably be toward greater utilization of agricultural crops for this purpose. At present the traditional outlets for our farm crops are insufficient to absorb the potential and desirable annual production. The development of new markets rests with research leading to new technological uses. The field of plastics not only presents a market of high potential consumption for staple crops, but also offers fruitful opportunities for crop diversification. Exploratory experiments indicate that starches and sugars may be employed as the principal raw materials for the preparation of plastics. Research in this field so far, however, has been of a superficial character, and no extensive literature on the subject exists. With the increase requested it is proposed to carry out systematic research on the condensation and polymerization of agricultural products for the production of plastics and to effect the chemical degradation of farm crops to produce new and useful raw materials for plastics.

WORK UNDER THIS APPROPRIATION

The work under this appropriation is concerned with the industrial utilization of farm products, byproducts, wastes, and surpluses through the application of chemical, physical, and technological methods, including the changes produced by micro-organisms such as yeasts, bacteria, molds, and fungi. The work comprises studies relating to the conservation of hides and skins through the development of improved methods of curing and tanning; the serviceability of leather; the development of new sources of tanning materials to supplement our dwindling national supplies, and the study of methods of application of such materials; the industrial utilization of the 260,000,000 tons of straw, cornstalks, hulls, and similar agricultural byproducts now produced annually for the manufacture of industrial cellulose and its derivatives, paper, pressboard, pulp, etc.; the utilization of agricultural wastes such as fruit and cannery wastes, etc.; research in the chemistry of lignin to provide an outlet for the 40,000,000 tons of this material now produced annually; development and standardization of biological stains required in the study of plant and

animal diseases and all biological research; the study of the production of derivatives of oils, fats, and waxes, with a view to their utilization in industry; study of the production of synthetic resins and plastics from agricultural raw materials; and the application of microorganisms to the production of valuable substances from agricultural crops and byproducts, including studies on the factors involved in the production of industrial alcohol from renewable sources of raw materials.

Recent developments in agriculture have indicated the need for the utilization of farm products for purposes other than food and clothing. Research conducted under this appropriation points the way to this end and widens the farmers' markets by opening up to agricultural products fresh fields of utilization. Industrial experience has definitely shown that the recovery and utilization of byproducts or waste products are vital functions of any successful business enterprise. Agriculture, to be successful, can not afford to ignore the technique of industry nor disregard the presence of numerous and varied byproducts. The direct utilization or conversion of these materials into revenue-producing commodities is a problem which must be continuously and diligently studied to strengthen the economic status of present-day agriculture.

(d) AGRICULTURAL FIRES AND EXPLOSIVE DUSTS

Appropriation Act, 1937.....	$48,403
Budget Estimate, 1938.....	58,403
Increase.....	+10,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Agricultural Fires and Explosive Dusts:				
(a) Agricultural fires....	$12,215	$13,522	$13,522	- - -
(b) Explosive dusts.....	33,904	34,881	44,881	+$10,000(1)
Unobligated balance.....	2,284	- - -	- - -	- - -
Total appropriation.....	48,403	48,403	58,403	+10,000(1)

INCREASE

(1) An increase of $10,000 for the development of methods for preventing explosions and fires in the industrial utilization of agricultural products.--This increase is necessary in order to expand the dust explosion work to provide for the development of safety measures for the prevention

of explosions of solvents, gases, and vapors used in processing agricultural products, particularly on a rural community basis. Within the past year several very serious explosions have occurred in recently-established soybean processing plants, causing large losses of life, property, and foodstuffs. Studies should be made of processing operations in soybean plants in Illinois, Indiana, Iowa, Missouri, Wisconsin, Michigan, Ohio, Virginia, and other States. Explosions in plants processing agricultural products will be thoroughly investigated. The industrial utilization of many agricultural products is being prevented or retarded until these safety measures for explosion and fire prevention can be developed. New outlets for agricultural products are essential with our changing land use. The adoption of new manufacturing methods which utilize explosive solvents and gases in the processing of agricultural products has introduced new explosion and fire hazards. Unless safety measures can be immediately developed, much of the earlier research work on the utilization of farm products will be lost. The dust explosion and fire hazard constitutes a serious menace to life and property in 28,000 industrial plants handling products of agricultural origin, which normally employ 1,325,000 persons; in 20,000 country grain elevators, largely farmer-owned and representing a capital investment of $450,000,000; and in 15,000 cotton gins with an estimated value of approximately $200,000,000. During the past 20 years 390 dust explosions have occurred in the United States in connection with the handling and processing of farm products; 320 persons have been killed, 737 injured, and the property loss has been over $35,000,000. Such explosions have occurred in practically all grain-handling industries, in starch factories, sugar refineries, powdered-milk plants, and plants producing insecticides, fertilizers, wood pulp, soap powder, and many others associated with the processing of agricultural products. Each industry presents a different problem, and each new development in the industry involves new hazards. An adequate program for the development of methods of control and prevention of dust explosions and resulting fires will effect a saving of life and property, conservation of food crops, reduction in insurance costs, and safety in the application of new industrial processes for the utilization of farm products.

WORK UNDER THIS APPROPRIATION

Work under this appropriation includes studies of dust explosions and explosion hazards in grain-handling operations and in industrial plants handling products of agricultural origin, experimental chemical research and development work on the prevention of dust explosions and resulting fires, and the practical application of the results of this research. Special attention is being given to the development of safety codes for dust-explosion prevention. Chemical and engineering research is also conducted on the causes of self-heating of agricultural products and on the development of equipment and methods for the prevention and control of farm fires. Active cooperation is carried on with farm organizations, agricultural experiment stations, industrial companies, insurance organizations, State commissions, fire-prevention asseciations, safety organizations, and other interested agencies in the practical application of the results of this research work and in the preparation of protective measures. These investigations are directly concerned with saving human life and property, and the research work is directly associated with the development

of safety measures in the more efficient utilization of agricultural products. Increased industrial operations and the utilization of byproducts and waste materials resulting in the production and accumulation of large quantities of explosive dusts have greatly increased the hazard. With practically every new development for the utilization of agricultural products it is necessary to work out new methods for protection from dust explosions and agricultural fires.

(e) NAVAL-STORES INVESTIGATIONS

Appropriation Act, 1937.....	$79,241
Budget Estimate, 1938.....	81,400
Increase.....	+ 2,159

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Naval-Stores Investigations:				
(a) Naval-stores production, processes, and equipment.....	$43,000	$41,311	$43,470	+$2,159 (1)
(b) Composition, properties, components, and derivatives of naval stores..	18,956	21,145	21,145	- - -
(c) Uses, handling, and transportation of naval stores.....	14,124	16,785	16,785	- - -
Unobligated balance.....	661	- - -	- - -	- - -
Total appropriation.....	76,741	79,241	81,400	+ 2,159 (1)

INCREASE

(1) An increase of $2,159 to provide for the employment of personnel for the protection of the Bureau's naval stores station at Olustee, Florida. The total investment in buildings and equipment at this station is now at least $150,000. In addition, in the usual course of operations, there is kept on the grounds $5,000 worth of gum, turpentine, and rosin belonging to naval-stores cooperators. At the present time the station is without adequate force or facilities for the proper protection of these investments against fire, theft, or other damage.

WORK UNDER THIS APPROPRIATION

The purposes of the work under this appropriation are to improve agricultural-chemical-technological practices, processes, and equipment for the production of turpentine, rosin, and related products, so as to prevent deterioration and waste, reduce production costs, and obtain products of better quality; to promote the utilization of turpentine, rosin, and related products through fundamental studies of their chemical composition and properties; and, through applied chemical research, to develop processes and equipment for improving established products and especially to develop the new uses needed to absorb current production and the inevitable increase that will occur within a few years. More than 12,000 farmers of the South produce turpentine and rosin. Approximately 60,000 people are employed in naval-stores production and distribution. The average annual value of naval stores is approximately $40,000,000. Naval stores are important day-to-day cash crops of the South, affording a living to more than 300,000 persons in an area 70 percent of which is devoted to the growth of forests and providing the major business of large areas of the South. Today's average annual production of naval stores is approximately 600,000 fifty-gallon casks of turpentine and 2,500,000 500-pound barrels of rosin, with an assured potential production through voluntary re-growth of pine timber of three or four times as much within 25 years. Apparently the one hope of naval-stores producers lies in the reduction of costs of production and the development of new uses through research. Investigations on naval stores bring greater returns to the turpentine farmer and have a direct bearing on the economic maintenance of the pine forests of the South, thus also helping to keep submarginal lands out of other agricultural crops for which they are neither suited nor needed. The recently established naval-stores experiment station in the Osceola National Forest offers facilities not available elsewhere for research on the technology of naval-stores production in cooperation with the forest management research of the Forest Service.

(f) SOIL SURVEY

Appropriation Act, 1937.....	$301,208
Budget Estimate, 1938.....	301,208

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Soil Survey:			
(a) Investigation, classification, and mapping of soils in the field.....	$210,491	$215,670	$215,670
(b) Field inspection of soil surveys and correlation of soil types and series..	30,788	32,788	32,788
(c) Adjusting, constructing, and drafting soil maps and charts for reproduction...	35,750	52,750	52,750
Unobligated balance.....	9,179	- - -	- - -
Total appropriation.....	286,208	301,208	301,208

WORK UNDER THIS APPROPRIATION

The object of the Soil Survey is to classify and map soils of the United States and to describe their characteristics, particularly in reference to the growth of various crops, grasses, and trees. The ultimate purpose is to provide accurate soil maps of the country necessary for the classification of rural lands and for the factual basis in the development of any rational program of land use, whether by public agencies or the individual farmer. The work comprises the determination of the character of soils, the definition of soil types, development of a uniform system of classification for the Nation, delineation upon maps of the boundaries of each type, the correlation of the various soil types in the country, and the interpretation of their relationship to the production of crops, grasses, and trees. This information is made available in published form to those interested in all phases of agriculture and other problems of land use. State cooperating agencies and other public organizations are furnished advance photographic copies of the field work for their immediate use where needed at once. Essentially all of the work is accomplished in financial cooperation with the various States and is necessary to them for the development of programs for the readjustment of their agriculture on a sound basis. For the past several years special reports and surveys have been made for various other Governmental agencies which have need for physical data regarding land in order to develop the programs which are under their responsibility.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Agricultural Adjustment Administration (transferred to Bureau of Chemistry and Soils):		
1. Payments for Agricultural Adjustment:		
Soil surveys in Puerto Rico.....	$18,232	$6,726
Soil surveys in Hawaii.....	5,229	- - -
2. Salaries and Expenses:		
Soil surveys in Hawaii.....	- - -	15,000
3. Puerto Rico and Hawaii Trust Funds (Processing Taxes, Sugar):		
Soil surveys in Puerto Rico.....	1,480	- - -
Soil surveys in Hawaii.....	3,964	- - -
Total, A.A.A. Funds.....	28,905	21,726

(g) SOIL CHEMICAL AND PHYSICAL INVESTIGATIONS

Appropriation Act, 1937.....	$78,081
Budget Estimate, 1938.....	78,081

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Soil Chemical and Physical Investigations:			
(a) Chemical and physical analyses and tests of soils and soil materials.....	$14,000	$14,000	$14,000
(b) Investigations of the chemical and physical properties of soils	38,878	49,081	49,081
(c) Selenium investigations.....	15,000	15,000	15,000
Unobligated balance.....	203	- - -	- - -
Total appropriation.....	68,081	78,081	78,081

WORK UNDER THIS APPROPRIATION

Work under this appropriation includes research on the chemical and physical properties of soil components and their significance in soil classification and other phases of soil science; study of the selenium content of soils and its relation to toxicity of vegetation grown thereon; and chemical and physical analyses and tests of soils and soil materials chiefly for the soil survey and other Government agencies. Service work for the Government agencies consists of mechanical analyses and chemical determinations which are required for specific problems in soil survey, erosion control, plant industry, animal industry, buildings and grounds projects, and other problems relating to soils and soil materials. Research work is at present largely centered on soil colloids--the active components of the soil, a thorough knowledge of which is essential to satisfactory classification of soils for land utilization and land conservation; study of soil organic matter, including chemical research on peat, with a direct bearing on the utilization of 110,000,000 acres of domestic peat deposits; and investigations of soil moisture relationships. A special study is being made of the various quick tests of soil needs in order to correlate the numerous diverse methods in use and to provide a method of general validity. Selenium investigations are concerned with the determination of the extent and intensity of the selenium toxicity of soils, a condition which exists in more or less acute form in widely distributed areas in the Middle West and which results in the growth of toxic vegetation responsible for certain animal diseases in the sections affected.

(h) FERTILIZER INVESTIGATIONS

Appropriation Act, 1937.....	$269,595
Budget Estimate, 1938.....	269,595

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Fertilizer Investigations:			
(a) Mixed fertilizer investigations..	$59,200	$59,200	$59,200
(b) Potash fertilizer investigations.	31,000	31,000	31,000
(c) Phosphate fertilizer investigations	26,015	26,015	26,015
(d) Nitrogen fertilizer production investigations.....	34,370	34,370	34,370
(e) Catalyst investigations.....	32,440	32,440	32,440
(f) Biochemical nitrogen-fixation investigations.....	29,880	29,880	29,880
(g) Fundamental physical and chemical fertilizer investigations.....	56,135	56,690	56,690
Unobligated balance.....	555	- - -	- - -
Total appropriation.....	269,595	269,595	269,595

WORK UNDER THIS APPROPRIATION

Work under this appropriation consists of investigations on the chemistry, physics, technology, and production of the fertilizer ingredients, nitrogen, phosphoric acid, potash, and other soil amendments such as lime, sulphur, magnesium and manganese. The work has for its purpose the development of methods for the utilization of our many natural resources and byproducts in order to give the farmers the greatest value for the money they invest in plant food. The farmers of the United States normally use from 7,000,000 to 8,000,000 tons of commercial fertilizer each year at a cost of approximately $250,000,000. The research is directed toward the development of more efficient and economical manufacturing processes; production of new fertilizer compounds, such as calcined phosphate, urea compounds, and ammoniated peat; improvement in the quality of fertilizer materials to give maximum beneficial effects to crops and soils and improvements in their physical condition to facilitate handling and distribution in the field; increasing the concentration of fertilizers and eliminating fillers to reduce handling, bagging, storage, and transportation costs; and utilization of new sources of raw materials, of low-grade materials formerly wasted, and of byproducts from the industries. The solution of these main problems also calls for the use of many fundamental chemical and physical data which can be obtained only by a comprehensive research program. The development of suitable fertilizers and methods for their more effective use have important bearing on the proper utilization of land and on rehabilitation problems.

The work includes investigations of the preparation, properties, and efficiency of mixed fertilizers, the transformation and utilization of potash-containing materials, development of new processes for making phosphate fertilizers, preparation of organic and synthetic nitrogen products, development and improvement of catalytic procedures for use in fertilizer production, biochemical nitrogen-fixation investigations, and physical and chemical investigations, including X-ray, crystallographic, spectroscopic, photochemical, high-pressure and high-temperature studies, and mathematical analysis as applied to fertilizer and related agricultural problems.

EMERGENCY FUNDS
(Complete bureau statement)

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Agricultural Adjustment Administration (transferred to Bureau of Chemistry and Soils):		
1. Payments for Agricultural Adjustment:		
Soil surveys in Puerto Rico.....	$18,232	$6,726
Soil surveys in Hawaii.....	5,229	- - -
2. Salaries and Expenses:		
Soil surveys in Hawaii.....	- - -	15,000
3. Puerto Rico and Hawaii Trust Funds (Processing Taxes, Sugar):		
Soil surveys in Puerto Rico.....	1,480	- - -
Soil surveys in Hawaii.....	3,964	- - -
Total, A.A.A. Funds.....	28,905	21,726

PASSENGER-CARRYING VEHICLES

The authorization for the purchase of passenger-carrying vehicles for the Bureau of Chemistry and Soils contemplates a decrease of $845 ($2,420 in 1937; $1,575 estimated for 1938) for this purpose. This authorization will permit the needed replacements of 3 vehicles at an estimated net average cost of $528 each when exchange allowances are taken into account. These cars are required for the inspection and supervision of soil-survey field work throughout the United States.

The 3 cars to be exchanged are used in official travel of from 12,000 to 20,000 miles a year. By the end of the fiscal year 1938 these cars will be 3 years old and will have traveled from 40,000 to 60,000 miles. Replacement of these cars will, therefore, be more economical than to continue to operate them at increasing costs for maintenance and repair.

BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE

(a) GENERAL ADMINISTRATIVE EXPENSES

Appropriation Act 1937.....	$162,288
Budget Estimate 1938.....	166,280
Increase.....	3,992

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
General administration and business service.....	$161,930	$162,288	$166,280	+$3,992 (1)
Unobligated balance.....	358	- - -	- - -	- - -
Total appropriation.....	162,288	162,288	166,280	+ 3,992 (1)

INCREASE

(1) An increase of $3,992 to provide additional library assistance. The section of the Department library containing the extensive literature on entomology is housed just across the corridor from the main library. By cooperative arrangement with the main library the books, periodicals, etc., are cared for and handled by employees of the Bureau of Entomology and Plant Quarantine. Even with the economies now possible by the present favorable arrangement, it is entirely impossible for the present staff of workers to meet the demands for library assistance. The pressure of current work is so heavy that the library personnel does not have an opportunity to abstract or classify publications so that they may be fully available to the Bureau workers. There is, therefore, considerable duplication of work and lost effort because individual investigators have to consult large numbers of periodicals for the literature dealing with the problems to which they are assigned. A single handling of these publications by competent library assistants would permit the indexing of articles on the various subjects so that they would be readily available to the individual investigators without undue loss of time. The increased activities of the Bureau of Entomology and Plant Quarantine have required much additional work in the library, but the number of individuals responsible for the care, maintenance, and classification of the extensive literature on entomology and kindred subjects has not kept pace with the volume of work. The proposed increase would provide two assistants.

WORK UNDER THIS APPROPRIATION

The funds provided under this appropriation are used for general administrative purposes, including the determination of policies; general administrative supervision of all departmental and field activities; business operations; approval and preparation for publication of manuscripts concerned with the scientific, technical, and other activities of the Bureau; preparation

and distribution of general information on control of insect pests; maintaining of a comprehensive library of entomological literature and the preparation of bibliographies on entomological subjects; and the handling of general information relating to Federal quarantines and preparation of cases on quarantine violations.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Public Works Allotment (National Industrial Recovery Act):		
Physical improvements	$474	- - -
Emergency Relief Appropriation Act of 1935:		
General administrative expenses	28,221	$6,779
Emergency Relief Appropriation Act of 1936:		
General administrative expenses	- - -	30,000
Total, Emergency Funds (Direct Allotments)	28,695	36,779

(b) FRUIT INSECTS

Appropriation Act 1937	$399,531
Allotment to "Foreign Parasites" (collection and introduction into this country of natural enemies of the Oriental fruit moth and of Japanese and Asiatic beetles)	-7,900
Total available 1937	391,631
Budget Estimate 1938	428,600
Increase	36,969

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. Investigations on apple and pear insects.....	$90,270	$90,670	$90,670	- - -
2. Investigations on peach insects.....	35,924	36,900	52,869	+ $15,969(1)
3. Investigations on grape insects.....	10,950	10,995	10,995	- - -
4. Investigations on nut insects.....	20,380	20,500	26,500	+ 6,000(2)
5. Investigations on insects attacking dried fruits.....	15,847	16,002	16,002	- - -
6. Investigations on insects attacking citrus and other subtropical fruits.....	40,127	41,020	41,020	- - -
7. Investigations on fruit flies which are potential pests in continental United States.....	57,686	60,411	75,411	+ 15,000(3)
8. Investigations on the insecticidal value of oils...	5,095	5,120	5,120	- - -
9. Investigations on Japanese and Asiatic beetles.....	107,472	110,013	110,013	- - -
Unobligated balance.....	7,880	- - -	- - -	- - -
Total appropriation.....	391,631(a)	(a)391,631	428,600	+ 36,969

(a) For 1936, excludes $7,900 allotted to "Foreign Parasites" set up as a separate item in Estimates for 1938.

INCREASE

The increase of $36,969 in this item for 1938 consists of:

(1) An increase of $15,969 for expanding research on the insect transmission of peach diseases. It is essential to the proper control work of the Bureau on diseases of peach trees that certain research information be secured on the relation to such diseases of the insects found in peach orchards. There is every reason to believe that the phony peach disease and peach mosaic are transmitted by insects, but it has as yet been impossible to incriminate any particular species. A careful survey of the peach-insect population in areas in which those diseases are active would undoubtedly point to the species most likely to be involved in disease transmission and thus serve as a basis for more intensive work in particular places where the diseases are active. This is particularly important in view of the heavy losses occasioned, for example, by the peach mosaic disease. This is the newest of the peach virus diseases, first recorded in 1931. It is very destructive, and the natural

local spread by means of unknown agencies is so rapid that an entire orchard planting may be infected in a few seasons. As evidence of the destructiveness of the disease, it may be said that in the commercial area of Mesa County, Colorado, it has in the past two seasons been necessary to remove more than 35,000 diseased trees.

(2) An increase of $6,000 for the inauguration of studies on filbert nut insects. The production of filbert nuts is becoming an industry of importance in the Pacific Northwest, especially in Oregon and southern Washington. The acreage just coming into bearing is suffering from attack by a number of species of insects about which there is at present comparatively little information and for which no control measures are available. A particularly serious pest is the Catalina cherry moth, the larvae of which infest the nuts, causing much damage and also involving heavy expense in sorting infested nuts from sound ones. At present no effective control measure is known for this insect, nor for an undetermined species of weevil which is causing damage to filberts. The increase requested will be applied to studies on these and other insects and the development of measures for their control.

(3) An increase of $15,000 for the investigations on fruit flies which are potential pests in continental United States. A number of fruit flies occur in Mexico, Hawaii, Puerto Rico, and the Canal Zone which, should they become established in the United States, would seriously menace our horticulture. During the past few years certain fruit flies of major importance, native to Mexico, have been collected in increasing numbers from traps operated in the lower Rio Grande Valley of Texas in connection with the campaign to control the Mexican fruit fly. One of these, normally considered as a pest of citrus, has recently been found in newly-established peach cultures in the plateau section of Mexico where it has done material damage, demonstrating its importance as a pest of deciduous fruits. Little is known regarding the habits, hosts, and responses of these species. The fact that they reached the border of the United States by natural means and occur farther north in Mexico than previous records indicate emphasizes the necessity of determining facts regarding them so they can be combated in the event that infestations should be found in the United States. In addition to securing information regarding their life history and habits, it is necessary to carry on basic studies to develop effective attractants and sprays and determine the exact time to kill the immature stages by high and low temperatures. The campaign for the eradication of the Mexican fruit fly being carried on in the lower Rio Grande Valley is planned and organized on the basis of information secured in connection with investigations of this nature, and it is planned to allocate $9,000 of the proposed increase to work in Mexico.

The Mediterranean fruit fly and melon fly, two important fruit flies of wide distribution, have long been established in Hawaii. Recent studies disclose that these two flies do not respond in the same manner to poisons, attractants, or temperatures. The present work in Hawaii is directed principally to the Mediterranean fruit fly. Even with this pest it has not been possible to develop all necessary information regarding responses to attractants, toxicity of various poisons that may be used in sprays, and the effect that temperatures from 34° to 38° may have on this pest. Investigations of this nature should be expanded in order that necessary facts will be available as a basis for combating the pest in the event that in-

festation should be discovered in the mainland. Many of these studies can be carried on concurrently with similar studies on the melon fly, for which practically no information of this type is available. Insistent demand for information on methods of sterilizing fruits and vegetables so as to kill immature stages of fruit flies, both on the part of the Territory of Hawaii and of foreign governments, emphasizes the need of immediately expanding the work that has been carried on in Hawaii, It is proposed to allocate $6,000 of the recommended increase for this purpose.

WORK UNDER THIS APPROPRIATION

General.--The activities under this item are concerned with the investigation and development of control measures for insects affecting fruits, fruit trees, nuts, grapes, and those small fruits which have their seeds internally such as blueberries and cranberries. Investigations on the Japanese and Asiatic beetles and fruit flies--such as the Mediterranean fruit fly and the Mexican fruit fly--are also carried on under this item. Field laboratories at which investigations are conducted and where growers may obtain information as to control of pests are maintained in the principal fruit-growing regions of the country. Laboratories are also maintained at certain places outside the continental United States as headquarters for investigations on fruit flies. The work is grouped under the following projects:

1. Investigations on Apple and Pear Insects.--Practically all the funds provided under this project are allotted for the development of effective and economical means of controlling numerous pests of apples. The standard control for the codling moth leaves harmful insecticidal residues on the harvested fruit and presents such a critical situation and such a difficult problem that funds under this project have, during the past year, been devoted almost exclusively to investigations on the codling moth. The use of the standard insecticide, arsenate of lead, for the control of the codling moth leaves residues of lead and arsenic which may be injurious to human health. This condition is corrected in part by washing the fruit in dilute hydrochloric acid or other solvents to remove excessive residue. This operation is costly and can not be economically applied throughout the entire country. Effective substitutes for the method of control now recommended are needed at as early a date as practicable. The investigations now under way include laboratory and field tests on new insecticides, control by traps and baits, and the use of cultural practices and natural enemies. Investigations on the codling moth are conducted from laboratories at Yakima, Wash., Vincennes, Ind., Kearneysville, W. Va., Geneva, N. Y., and Beltsville, Md. These activities are closely coordinated with work done by State agencies and in cooperation with other branches of the Department.

A small part of the funds under this project are used for incidental investigations on such pests as the woolly apple aphid, the tarnished plant bug, and the pear thrips. The losses caused by the pear thrips during the past few years have been especially heavy, and cooperative studies have been begun with the Oregon Agricultural Experiment Station.

2. Investigations on Peach Insects.--Funds allotted to this project are used for investigations on the Oriental fruit moth, the plum curculio, the San José scale, and the peach-tree borer. In the absence of effective in-

secticidal control for the Oriental fruit moth, emphasis is being placed on the control of this pest by natural enemies. Certain native parasites have proven to be effective and these are being colonized in areas recently infested by the moth. In addition to colonization of native parasites, special attention is devoted to the importation and colonization of parasites from Japan. Several very promising parasites have been imported from the Orient and are being propagated at the laboratory at Moorestown, New Jersey, for liberation in infested areas. In some limited sections parasites have become sufficiently well established to bring about very appreciable control. Further work in this field should be of material benefit to other sections of the extensive area now infested by this pest.

Investigations on the plum curculio and peach-tree borer are being carried on at the laboratory in Fort Valley, Georgia. In the case of the curculio, special attention is being directed toward the development of measures for control which will not require the use of lead arsenate throughout the season. When so used in areas where two broods of the curculio occur, objectionable residues may remain on the fruit after harvest, and no method for its removal is available. In the studies on the peach-tree borer, special attention is given to developing means for disinfecting nursery stock so as to eliminate infestation by the borer and thus reduce the possibility of the spread of this insect, which may be one of the carriers of the phony peach disease. The residual effect of lime-sulphur as an aid in the control of the San Jose scale has been studied.

3. Investigations on Grape Insects.--The major problem being studied under this project is the development of effective means of controlling the grape berry moth without causing objectionable spray residues. Studies are under way to determine the practicability of modifying cultural practices so as to keep down heavy infestations, thus reducing the number of spray applications necessary. Investigations on insecticides other than those which leave objectionable spray residues are also under way. Many of those tested remove the "bloom" of the grape desired especially for table varieties. The impracticability of washing grapes increases the difficulty of solving this problem. Changes in materials used in sprays or in the spray schedule also affect the control of certain other pests, such as the grape root worm, the rose chafer, and the leaf roller, which have heretofore been held under control by sprays applied for the grape berry moth. Small amounts are used for studies on two of the more important of these. The principal investigations on grape insects are carried on from a laboratory at Sandusky, Ohio.

4. Investigations on Nut Insects.--The funds now allotted to this project are used for the development of methodsof controlling insects attacking pecans. These studies include investigations on such pests as the nut case bearer, shuckworm, pecan phylloxera, pecan black aphid, and obscure scale. Effective controls for these pests are not available under all conditions existing throughout the area where pecans are produced. The controls applied in some sections are unsuitable in others. In some sections the use of oil sprays for the control of scale has caused considerable tree injury not experienced in other localities. Field laboratories are maintained at Albany, Ga., Brownwood, Texas, and Shreveport, La.

5. Investigations on Insects Attacking Dried Fruits.--The work under this project is concerned with insects attacking dried fruits and the determination of methods for their control. Many of the insect pests found in dried fruit occur in and infest the fruit in the orchard as well as when it is being dried and stored. These activities are largely centered in the laboratory at Fresno, Calif., and many of them are carried on in cooperation with the University of California and the Dried Fruit Association of California.

6. Investigations on Insects Attacking Citrus and Other Subtropical Fruits.--Funds allotted for this project are used for studies on the control of certain insect pests of citrus. Work is carried on at field laboratories maintained in Florida and California. In California particular attention is devoted to the development of effective methods of controlling the California red scale and citrus thrips. Methods for the control of this pest previously worked out have been found to be ineffective in certain sections where the insect seems to be resistant to the standard methods of control by fumigation. In this same general section the control of citrus thrips by the use of sulphur is not fully effective. The method and time of application of various controls require further study. Work in California is carried on in cooperation with the California Citrus Experiment Station and is coordinated with that done by other agencies.

In Florida special studies are being conducted in cooperation with the Bureaus of Plant Industry and Chemistry and Soils on the effect of insecticides on citrus trees and fruits. Similar tests are also being applied in the lower Rio Grande Valley of Texas. The use of sulphur for the control of rust mites and certain scale insects is also being studied in Florida. Special emphasis is being placed on the timing of applications and the relation of the dosages, including determination of the period during which sulphur may remain on the foliage in sufficient amounts to be effective.

7. Investigations on Fruit Flies Which Are Potential Pests in Continental United States.--The work under this project is concerned with investigations on the biology and methods of controlling certain important fruit flies in their native regions in order to provide information which will aid in preventing them from entering the United States or which may be effective in combating them should they become established in the United States. The investigations are headquartered at Honolulu, Hawaii; Mexico City, Mexico; Balboa, Canal Zone; and Mayaguez, Puerto Rico. The work in Hawaii is concerned with the Mediterranean fruit fly. Special attention is now being directed to the development of bait sprays to be used in controlling the adults, development of attractants that may be used in traps, and determination of more effective methods for the disposal of waste or cull fruit. Additional tests to determine the time interval when certain high and low temperatures are fatal to the fruit fly are also under way. In Mexico City special attention is directed to the Mexican fruit fly and certain related species. Particular attention is now being given to developing attractants that can be used in traps to detect the presence of the fly, as well as sprays to aid in its control. Such information is particularly needed in connection with the work in the lower Rio Grande Valley in Texas. Some very promising leads have been developed, and it is hoped that it will soon be possible to use a bait spray which is more effective than the one containing nicotine sulphate now being used in the lower Rio Grande Valley of Texas. The work in the Canal Zone is concerned with studies on the life history, habits, and

hosts of numerous species of fruit flies which occur there and which are a menace to the fruit cultures of the United States. In Puerto Rico experiments are under way to determine more effective methods of eradicating the West Indian fruit fly, its relation to various hosts, and the effectiveness of different sprays and attractants.

8. Investigations on the Insecticidal Value of Oils.--Oil sprays are coming into more extensive use for the control of all kinds of insect pests en deciduous fruit trees. Basic information is urgently needed to determine the possibility of using highly-refined oils for this work. These studies, which include cooperative work with entomologists and chemists of the Insecticide Unit, are being carried on at a laboratory maintained at Wooster, Ohie, in cooperation with the Ohio Agricultural Experiment Station. Particular attention is directed to the development of oil sprays that may be used during the dormant period to kill the eggs of certain insects which hibernate in this stage and to kill dormant scale insects and hibernating worms.

9. Investigations on Japanese and Asiatic Beetles.--This project provides for investigations to determine methods of control for three introduced pests of major importance--the Japanese beetle, Asiatic garden beetle, and Oriental beetle. The work is concerned with the development of more effective methods of control of these pests by the use of insecticides by artificial means, the introduction and colonization of parasites which may aid in reducing their numbers, and the determination of methods of treating plants or plant products which may carry this pest into uninfested regions. Investigations to determine more effective methods of controlling adult beetles include work on traps that may reduce their numbers or detect their presence at points where the infestation is very light and the development of repellents which may be used in protecting various plants and fruits which are severely injured by the feeding of the adult beetles. These investigations are headquartered at a laboratory at Moorestown, New Jersey, with sublaboratories at St. Louis, Mo., and certain other outlying sections.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Territory of Hawaii Trust Fund, Sugar Processing Taxes (authorized by Sec. 15 (b), Agricultural Adjustment Act, as amended): Development of methods for control of fruit flies in Hawaii.....	$13,283	- - -
Agricultural Adjustment Administration (Payments for Agricultural Adjustment): Fruit-fly control in Hawaii.....	42,217	$24,500
Total, Emergency Funds (Direct Allotments).	55,500	24,500

(c) JAPANESE BEETLE CONTROL

Appropriation Act 1937.....	$350,000
Budget Estimate 1938.....	400,000
Increase.....	50,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Japanese beetle control operations:				
Supervision of nurseries and greenhouses for Japanese beetle control.....	$169,700	$170,000	$170,000	- - -
Scouting adjacent to nurseries and greenhouses for Japanese beetle control.....	19,600	19,600	29,600	+$10,000(1)
Trapping to determine distribution of the Japanese beetle.....	85,942	86,000	96,000	+ 10,000(2)
Soil treatment and trapping in isolated areas to aid in preventing spread of the Japanese beetle.....	16,000	16,000	26,000	+ 10,000(3)
Farm products inspection for Japanese beetle control.....	26,000	26,000	36,000	+ 10,000(4)
Vehicular inspection for Japanese beetle control.....	22,400	22,400	27,400	+ 5,000(5)
Transit inspection for Japanese beetle control.....	3,500	3,500	3,500	- - -
Tests of treatment required for Japanese beetle control.....	6,500	6,500	11,500	+ 5,000(6)
Unobligated balance.....	358	- - -	- - -	- - -
Total appropriation.....	350,000	350,000	400,000	+ 50,000

INCREASE

The increase of $50,000 in this item for 1938 consists of:

(1) An increase of $10,000 for additional scouting to determine the presence or absence of Japanese beetles in or adjacent to nursery and greenhouse premises. This information is essential to the proper classification of such establishments in the quarantine area. Changing conditions of beetle

population are resulting in an increase in the number of establishments classified as infested, and a correct classification of these properties must necessarily be based on a careful inspection to determine the presence or absence of the beetle in the premises. If the property is beetle-free it is permitted to engage in interstate business without the quarantine restraints which are placed on properties classified as infested. Careful scouting and inspection, therefore, are necessary to protect the status of the establishment and the integrity of the Federal certificate. The proposed increase will be allotted for additional scouting work throughout the control area.

(2) An increase of $10,000 to carry on a trapping program adequate to indicate the presence or absence of Japanese beetles in areas outside the known infested area. Accurate knowledge of the distribution of the pest concerned is obviously essential to the effective operation of a quarantine. Present funds are inadequate to maintain a trapping program necessary to develop this information. An indication of the danger of curtailing this phase of the work is the infestation which occurred in the St. Louis area in the summer of 1933. Had this infestation been detected at that time instead of during the following season, the control work would have been much less difficult and expensive.

(3) An increase of $10,000 to extend the cooperative control work in isolated locations where infestations affecting territory hitherto uninfested may be held in check and quarantine actions delayed. Japanese beetle control operations of this type include soil treatment for the grubs and trapping for the adults. This work is being carried on at such places as St. Louis, Mo., and Detroit, Mich. Indication of the need for its expansion is the recent determination of an infestation at Chicago, Ill., and the discovery of beetles at localities such as Athens, Ga., and Knoxville, Tenn., remote from the known infested area.

(4) An increase of $10,000 to provide additional facilities for the inspection and certification of truck crops and other farm products grown within the infested areas for shipment to markets in uninfested areas. Increased beetle population over large sections of the generally infested area has brought large producing areas under more strict regulations, with the result that a greater proportion of products going to outside markets has been required to clear through inspection and certification channels. This has involved both increased volume of inspection work and the establishment of inspection at additional loading points. Because of beetle flight conditions, it is also necessary to take precautions to prevent beetles from entering freight cars which are being loaded. It is essential that the farm products inspection facilities keep pace with the demand in order to avoid disruptions of marketing programs and heavy losses to producers due to the perishable nature of their crops.

(5) An increase of $5,000 for the maintenance of road stations on highways leading from quarantined areas to make sure that products capable of carrying the beetle are moved only in accordance with the quarantine requirements. Due to the spread of beetle infestation and the normal increase in vehicular traffic, the present road station facilities are inadequate to meet the demand, and the proposed increase is intended to provide additional inspectors.

(6) An increase of $5,000 to provide an additional technical worker and necessary supplies and equipment to determine the effectiveness under commercial conditions of various recommended treatments as a basis of certifying products regulated under quarantine. It is essential that these treatments be studied and checked to make sure that they keep abreast of prevailing conditions.

WORK UNDER THIS APPROPRIATION

The funds provided under this appropriation are used for the control and prevention of spread of the Japanese beetle, including the determination of spread, the enforcement of quarantine regulations to prevent and retard spread into new localities, and the inspection and certification of nursery stock and other materials the movement of which is regulated under Federal and State quarantine. In cooperation with the State and local agencies, control measures are conducted to suppress the beetle at points considerable distances from the generally infested area to prevent the development of new centers of spread. During the past season the Japanese beetle has been more than usually destructive in many sections of the generally infested area. Scouting and trapping operations to discover its possible presence in localities outside of the known infested area had not been completed at the time of the preparation of these notes. A number of new points of infestation have, however, been discovered so far, and some changes in the boundaries of the quarantined area may be required when full information is available.

The work under this item is treated as one project but involves a number of activities which may be briefly described as follows:

The Japanese beetle occurs in the largest nursery sections of the United States. Nursery products grown in the infested area are shipped to every State in the Union. To prevent them from carrying the beetle to uninfested sections, all those moving from the quarantined area must be handled or treated in a manner to eliminate risk of the spreading of infestation. The stocks produced or handled as required by quarantine regulations are certified after prescribed inspection and may move freely and without risk of carrying the pest into new sections. The requirements provided as a basis of certification vary with the class of nursery stock and the degree of infestation in or adjacent to the nursery or greenhouse in which it is produced. The adequate enforcement of these requirements forms the sole protection against the distribution of the Japanese beetle by these materials. Nursery stock is one agent by which the beetle may easily be transported into new sections. It is believed that this pest entered the United States in soil around the roots of nursery stock. If our uninfested regions are to be protected from infestation, it is important that adequate provision be made for inspection and certification of similar material moving to points outside the quarantined area. There are more than 1,600 nurseries in the regulated area and hundreds of thousands of plants are offered for shipment annually.

Nurseries and greenhouses in the quarantined area are classified on the basis of presence or absence of beetles on or adjacent to the individual premises. The requirements for certification of the two classes of establish-

ments differ. A very essential part of the enforcement of quarantines for the protection of uninfested regions is the classification of these establishments, which can be determined only by scouting rather than by the use of traps. Inspection work of this type must be done with great care to avoid erroneous classification of establishments so as to work no undue hardship on the producer and at the same time give adequate safeguards against products that may move from their establishments.

It is essential to the effort to retard the spread of the Japanese beetle that we have accurate information as to the possible presence of outlying infestations. To secure this information traps are operated to determine the possible presence and relative abundance of the beetle. The traps are operated in selected localities where infestation is light and at places outside the known infested area, particularly along main highways or at important railroad centers. The prompt location of incipient outlying infestations can be accomplished only by this type of work, and any curtailment will, as in the case of St. Louis, Missouri, delay location of centers of infestation for a number of seasons. Trapping operations begin in the Southern States early in June and at later dates in the more northern sections.

The operation of a large number of traps to aid in the reduction of beetles is an important part of the control operations carried on at certain isolated centers of infestation. St. Louis, Mo., and Erie, Pa., are examples where trapping for control is carried on. In outlying areas where it is practical to locate sections where there is good reason to believe grubs occur in the soil, the application of certain treatments, such as arsenate of lead, will materially aid in reducing the number of beetles that appear next season. Work of this type is carried on in cooperation with the State or local agencies.

Many types of farm products, particularly fruits and vegetables, may carry adults of the Japanese beetle into uninfested regions. Beans, apples, peaches, and berries are produced in considerable quantities in the infested area and are products which must be handled under proper safeguard before they are shipped into the uninfested regions. The type of handling required prior to certification of various classes of products varies with the nature of the product. Various types of berries are fumigated and peaches are inspected, while beans are run through a mechanical device to shake off the beetles. Provision is also made that products inspected and certified be subsequently handled in a manner to prevent reinfestation. Products of this type are perishable, and the force of inspectors must be adequate to handle them promptly and effectively, so that they may move in as nearly a normal manner as possible and still eliminate the risk of spreading the beetle.

To assure that products likely to carry the beetle are being moved only in accordance with the requirements of the quarantine, road stations are maintained on various highways leading from the quarantined area.

Inspectors are stationed at certain important transportation centers within the infested area during part of the season to examine the products regulated by the quarantine in order to assure that common carriers comply with the regulations of the Japanese beetle quarantine regarding the movement of products that may carry this pest.

It is necessary to know that the methods of treatment devised under certain limited conditions are effective when applied commercially under different conditions. To determine the fitness or inadequacy of various treatments authorized as a basis for certifying products regulated under quarantine, it is necessary to make repeated tests. Without this repeated checking, possible weaknesses under prevailing conditions might not be detected and thus shipment of living beetles in certified articles might be unknowingly permitted.

(d) MEXICAN FRUIT FLY CONTROL

Appropriation Act 1937.....	$140,460
Budget Estimate 1938.....	160,460
Increase.....	20,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Mexican fruit fly control operations:				
Grove and packing-house inspection and certification for Mexican fruit-fly control.....	$107,660	$113,660	$128,660	+$15,000 (1)
Spraying and control of Mexican fruit fly in Texas..	15,850	16,800	21,800	+ 5,000 (2)
Spraying and control of Mexican fruit fly in Mexico.	5,000	5,000	5,000	- - -
Vehicular inspection for Mexican fruit-fly control...	5,000	5,000	5,000	- - -
Unobligated balance.....	6,950	- - -	- - -	- - -
Total appropriation.....	140,460	140,460	160,460	+ 20,000

INCREASE

The increase of $20,000 in this item for 1938 consists of:

(1) An increase of $15,000 to provide additional inspectors to enforce sanitary requirements on which certification of citrus fruit produced in the Rio Grande Valley is based. It is necessary to inspect groves every thirty days in order to enforce these requirements, and inspection must be carefully done in order to permit shipment of fruit which may properly leave the area and at the same time protect States outside the infested area which are susceptible to infestation. An absolute restriction of shipments would, of course, involve heavy loss to producers, while inadequate inspection and

certification would result in the movement of commodities capable of carrying the Mexican fruit fly to producing sections outside the infested area. During the past season there were approximately 6,000,000 citrus trees of bearing age in the Rio Grande Valley and inspection operations required the utmost effort by a staff of approximately thirty inspectors. By the fiscal year 1938 two million more trees will be bearing, and it will be absolutely essential to provide for four more full-time inspectors and additional seasonal help to enforce sanitary requirements in this additional acreage. Recently the Mexican fruit fly has been found in a new locality adjacent to the older area, making it necessary to enlarge the regulated area. This requires the establishment of another district, with corresponding increase in personnel. The proposed increase will provide for the salaries and miscellaneous expenses of such employees.

(2) An increase of $5,000 to provide additional facilities for spraying and control work necessitated by an expansion of the citrus area in bearing. Within the past two seasons a new type of trap made of glass has proved very attractive to the Mexican fruit fly and has served as a valuable means for determining the presence or absence of the insect. In addition to the trapping factor, it is necessary to spray groves in which flies are found.

WORK UNDER THIS APPROPRIATION

The work carried on under this item is concerned with the protection of fruit-growing areas of the United States from the danger of infestation by the Mexican fruit fly. This insect reached the American border in the lower Rio Grande Valley in Texas several years ago. It has been carried frequently and in large numbers to the border communities, particularly by shipments of infested fruit from points in Mexico, and has spread from these border towns to reinfest the citrus groves of southern Texas. It is the purpose of the Federal quarantine to prevent the spread of this insect to other fruit-growing areas, to eradicate the infestation in Texas, and to reduce the fruit-fly population as much as possible in the areas immediately adjacent in Mexico in order to minimize the danger of reinfestation from that source. In this effort good cooperation has been received from the local Mexican officials and from the residents of Mexican border towns. However, commercial fruit raising is not practiced on the Mexican side at this point, and hence such Mexican fruits as mangoes, etc., preferred fruit-fly hosts, are brought from interior points, and with them have come as many as 11,000 fruit-fly larvae in a single month.

The control work on the Mexican fruit fly involves a number of activities. These are briefly discussed in the following paragraphs:

There are very extensive plantings of citrus trees set out in grove formation in the Rio Grande Valley, and of this number more than 6,000,000 have already reached bearing age. Inspection of these groves during the season is necessary every thirty days to enforce the sanitary requirements on which certification of the fruit is based. These requirements provide for the picking up and burial of all fallen fruit, the removal of weeds, etc. Packing houses are permitted to accept only fruit produced in groves which meet the sanitary requirements; they are also required to dispose of

waste products and culls in an approved manner. The period when fruit may remain on trees is restricted so a non-host period is enforced during the summer. Traps to aid in detecting possible presence of the fly are operated in the groves. This and other related activities form the basis of certification of fruit and give protection from spread of this important pest. The States outside the infested area depend on the Federal quarantine to prevent the movement of commodities which might be capable of carrying the Mexican fruit fly to fruit-growing sections outside the infested area. The work under this activity is of importance not only to the uninfested sections but also to the producers in the infested area, as it enables the fruit to be safely shipped to market.

The use of traps to determine the presence or absence of the Mexican fruit fly has become of greatly increased importance due to the development of a new type of trap. When flies are detected in a grove it is sprayed with a poison spray. The proper application of this spray is essential and it must be closely supervised. If maggots are found in the fruit, much of the fruit of the infested grove has to be destroyed.

There continue to be found infestations of the Mexican fruit fly across the line in Mexico in the vicinity of Matamoros. It is necessary that there be certain inspection and cleanup work performed, all of which is done with the hearty cooperation of Mexican officials and the citizens of Mexico residing in the infested area. It will be necessary to continue this work in order to prevent the building up of infestations immediately adjacent to the American citrus cultures, which would be a constant menace to citrus production in the Rio Grande Valley.

Control of the movement of fruit out of the quarantined area is greatly simplified due to the fact that there are but few avenues for traffic. Two railroads and two highways leave the Valley. Boat transportation has recently been provided by the opening of a port at Brownsville. The acceptance of fruit for transportation by common carriers is subject to control by the cooperation of the companies. The cooperation extended by railroads has been especially satisfactory and effective. It is expected that similar cooperation will be extended by steamships which may have occasion to move fruit from Brownsville. Movement by private trucks and in passenger cars is controlled by the operation of two road stations.

(e) CITRUS CANKER ERADICATION

Appropriation Act 1937..... $13,485
Budget Estimate 1938..... 13,485

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Citrus Canker Eradication.....	$13,245	$13,485	$13,485
Unobligated balance.....	240	- - -	- - -
Total appropriation.....	13,485	13,485	13,485

WORK UNDER THIS APPROPRIATION

Work carried on under this appropriation provides for the eradication of the bacterial disease of citrus known as citrus canker. These activities are now carried on in cooperation with the States of Louisiana and Texas. Through intensive inspection of nurseries and citrus groves an effort is made to locate and destroy all trees infected with this dreaded disease. As a result of the vigorous campaign which has been carried on against this disease in the past, it has been practically eliminated from the important commercial citrus areas. However, some isolated infections occur sporadically. The States that were infected are maintaining a close inspection of all citrus properties, and this should be continued. Some infections still occur in Louisiana and Texas. No infection is known to affect commercial properties in Louisiana, but during the past two seasons infection has been found in non-commercial trees. In Texas some thirty-one separate infections have been found in three counties during the past eighteen months. A few of these were in commercial properties and some in localities where no infection had previously been found.

Intensive work on this disease is under way with an allotment from Emergency Relief funds, and an effort is being made to eliminate the source of all infections. This has disclosed the presence of the disease in jungle areas where citrus trees occur as voluntary or escape stands of no importance. These harbor the disease and prevent the completion of the eradication effort. Because of the extreme infectiousness of this disease, scattered infections may also occur in dooryard plantings outside commercial districts. It is necessary to follow up the work done in infected commercial properties and reinspect areas in non-commercial sections, even where trees have been removed, to see that all the shoots or sprouts have been eliminated or are free from infection. The presence of outside centers of infection is a menace to citrus cultures, and continued inspection and eradication work are essential until the disease has been completely eliminated. The States and growers are actively cooperating in these activities.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act of 1935:		
Citrus-canker eradication.....	$132,742	$12,758
Emergency Relief Appropriation Act of 1936:		
Citrus-canker eradication.....	- - -	145,500
Total, Emergency Funds (Direct Allotments)...	132,742	158,258

(f) PHONY-PEACH AND PEACH MOSAIC ERADICATION

Appropriation Act, 1937.....	$49,828
Budget Estimate, 1938.....	89,800
Increase.....	39,972

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1.Phony peach eradication.....	$49,460	$49,828	$49,828	- - -
2.Peach mosaic disease eradication	- - -	- - -	39,972	+$39,972 (1)
Unobligated balance.....	368	- - -	- - -	- - -
Total appropriation.....	49,828	49,828	89,800	+ 39,972

INCREASE

(1) The increase of $39,972 in this item provides for continuation, under regular funds, of the efforts to eradicate the peach mosaic disease, begun under emergency appropriations. A new virus disease of peach known as peach mosaic was first found in a part of the non-commercial peach area of Texas in 1931. In 1933 the disease of peaches first observed in western Colorado in 1929 was found to be identical with the disease previously known only from Texas. Early in 1935 the disease was observed in parts of western Utah and later during the same year was found in parts of southern California. More recently infected trees have been found in New Mexico. While little is known concerning this virus disease, it appears clear that it is transmitted by nursery stock or bud wood. Consideration is now being given to the promulgation of necessary quarantine restrictions to prevent further spread of the disease by this means. The following example of conditions in one orchard of 1,200 trees in Mesa County, Colorado, is evidence of the rapidity of the spread of the disease within an affected region: Two trees affected by this disease were observed in 1929, 10 were found in 1931, 100 in 1932, 200 in 1933, 500 in 1934, and all but 13 of the original 1,200 were infected in 1935. The disease does not attack the fruit but injures the tree, causing it to become stunted and to produce fruit which is hard, corky, and irregular in shape.

The disease presents a menace to peach cultures throughout the United States and every effort should be made to eradicate it. That this is practical appears to have been demonstrated by work carried on with allotments from emergency funds. These funds have been used in cooperation with State agencies to locate, remove, and destroy infected trees. In the work of eradication conducted in western Colorado during the summer of 1935 more than 30,000 infected trees were found and destroyed. Surveys conducted with emergency funds during 1936 disclosed the presence of only a comparatively few trees in the previously heavily infected area in western Colorado, and this would

seem to clearly indicate the practicability of eradication. With the available emergency funds the eradication work has been carried on in cooperation with State and local agencies, who have given it full support and endorsement and have made material contributions to its prosecution.

CHANGE IN LANGUAGE

The title and language for this item have been amended to include authorization for work on "peach mosaic". This amendment has consisted of adding to the title the words "and peach mosaic" and adding to the language the following: "and 'peach mosaic' ". The reasons for this change are set forth in more detail in the preceding paragraphs explaining the need for the increase in this item.

WORK UNDER THIS APPROPRIATION

This subappropriation provides for work on the control and eradication of two important diseases of peach. One of these diseases, known as phony peach disease, is a serious infectious disease which makes peach orchards unprofitable by reducing both the size and quality of the crop, proving disastrous to peach growing wherever it has become established. The other, peach mosaic, is a virus disease which has only recently appeared in parts of the United States which injures the tree, causing it to become stunted and to produce fruit which is hard, corky, irregular in shape, and of little or no commercial value. The removal of the diseased trees is the only known method of control for these two diseases, both of which may have been spread from tree to tree or from orchard to orchard by certain insects. Information is not available, however, as to the insects that may be involved in such transfer.

No regular funds have been provided for work on the disease known as peach mosaic. Considerable work has, however, been done on this disease with emergency funds. Regular appropriations have been provided for work on the phony-peach disease and, in addition to cooperating with State agencies in locating trees attacked by the disease, considerable attention has been devoted to aiding State inspection organizations in preventing the distribution of the exposed nursery stock into uninfected regions. All these activities are carried on in cooperation with State agencies.

The work on phony peach disease has been carried on in Alabama, Florida, Georgia, Arkansas, Illinois, Oklahoma, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Maryland, Kentucky, and Pennsylvania. In many States these infections are scattering, although they are general in the main peach-producing sections of Georgia, Alabama, Tennessee, North Carolina and South Carolina. The oldest infected section is in the State of Georgia. The work of eradication of this disease has been materially expanded with an allotment from emergency funds which permitted the removal of infected trees and wild and escaped trees which harbor the disease. The work done with these funds has materially aided in protection from this disease and given added encouragement to the peach industry, especially in the Southern States. The continuation of the work under regular funds is

necessary to cooperate with States to prevent the spread of the disease from infected areas; to permit scouting to determine possible new infected areas, especially in the Northern States; to provide for the inspection of nurseries; and to follow up on the work done in the infected areas in the Southern States.

The work on peach mosaic is carried on in States where infection has been discovered, including parts of Colorado, Utah, California, New Mexico, and Arizona.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act, 1935:		
Control of phony peach disease	$688,557	$48,943
Control of peach mosaic disease	35,442	22,478
Total	723,999	71,421
Emergency Relief Appropriation Act, 1936:		
Control of phony peach disease	- - -	293,333
Control of peach mosaic disease	- - -	80,000
Total	- - -	373,333
Total, Emergency Funds (Direct Allotments)	723,999	444,754

(h) FOREST INSECTS

Appropriation Act, 1937	$173,625
Allotment to "Foreign Parasites" (collection and introduction into this country of natural enemies of introduced forest insects)	-4,500
Total available, 1937	169,125
Budget Estimate, 1938	253,100
Increase	83,975

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. Native forest insect investigations.....	$94,634	$109,022	$174,997	+$65,975 (1)
2. Introduced forest insect investigations.	55,603	55,603	65,603	+ 10,000 (2)
3. Shade tree and hardy shrub insects.....	4,100	4,100	12,100	+ 8,000 (3)
4. Insect relation to azalea blight.....	400	400	400	- - -
Unobligated balance.....	178	- - -	- - -	- - -
Total appropriation.....	154,915(a)	169,125(b)	253,100	+ 83,975

(a) For 1936 excludes $600 allotted to "Fruit and Vegetable Crops and Diseases", Bureau of Plant Industry (for azalea flower blight work); $6,000 transferred to Project 2 from "Dutch Elm Disease Eradication"; and $4,500 allotted to "Foreign Parasites", which is being set up as a new item in the Estimates for 1938.
(b) For 1937 excludes $2,700 transferred to Project 2 from "Dutch Elm Disease Eradication".

INCREASES

The Act passed by the 70th Congress, approved May 22, 1928, and commonly referred to as the McNary-McSweeney Act, authorized annual appropriations up to $350,000 for investigations on insects injurious or beneficial to forest trees, wood or forest products. This authorization set up the above amount as that which should be available for the fiscal year 1938. The annual appropriations for the studies authorized have never exceeded approximately 70 percent of the authorization. The largest amount provided was in 1932 when somewhat less than $250,000 was provided. Since then the amount available has been reduced even below 42 percent of the authorization. In view of the excessive damage caused by insect enemies to forest trees and forest products, and the absence of effective measures for their control, the reduction in funds available to pursue these important investigations is not in harmony with the effort to conserve and protect our natural forest resources. To meet some of the more immediate problems confronting those engaged in forest conservation, small allotments of emergency funds were made available during the past two years. Even with these additions, the amount available has not equaled that appropriated before the present emphasis to protect and intelligently manage the national forest areas.

The increase of $83,975 in this item for 1938 consists of:

(1) <u>An increase of $65,975 in Project 1, "Native forest insect investigations," divided among three activities as follows</u>:

(a) An increase of $22,500 for investigating white-grub damage to forest nurseries and the blue-staining of wood due to bark beetles and other forest insects.

In connection with the recent acquisition of forest lands and the available labor through CCC camps, the Forest Service has undertaken a large-scale planting program in the Lake States (Minnesota, Wisconsin, and Michigan). Severe losses have resulted from white-grub damage in the nurseries where the seedlings are grown and on the planted lands. In order to advise the Forest Service as to its planting program, it will be necessary for this Bureau to make surveys on the land scheduled for planting in order to determine white-grub population and also to conduct investigations on the chemical treatment of soils to prevent white-grub damage in nurseries. It is proposed to allot $15,000 of the increase for this purpose, of which approximately $10,000 will cover personnel costs and the remainder travel, supplies, and equipment.

The recent development of Southern pines for use as newsprint opens up a tremendous field for the utilization of second-growth pine. Preliminary experiments made by private industry and by the Forest Products Laboratory have indicated that blue-staining of the wood brought about by bark beetles attacking the freshly felled trees is a serious obstacle to the use of the wood for newsprint. It is therefore essential that investigations be made to develop means for preventing the attack of felled trees by bark beetles, as well as damage to growing stands of timber by the Southern pine beetle, the Ips bark beetle, and white grubs in nurseries and on plantations. It is planned to allot $7,500 of the $22,500 increase to these studies, which will be headquartered at Asheville, N. C., and will involve the employment of two entomologists.

(b) An increase of $7,500 for expanding investigations of insects injurious to forest products. This project involves basic research in the methods of treating living timber for the prevention of wood borers and termite attacks and includes service tests of a large variety of wood preservatives. Preliminary work indicates that trees can be treated by a very simple method and thus made serviceable for fence posts, rustic work, etc. The cost of this method will be much less than present commercial practices, and it will have the additional advantage of being readily adaptable to use on the farm woodlot. Work along this line has been inaugurated under allotments from E.C.W. funds, and the proposed increase will permit its continuance. It will be headquartered at Asheville, N.C.

(c) An increase of $35,975 for surveys to locate and determine the status of infestations of native insect pests of forests. With this sum surveys of forested areas will be made to locate possible infestations of the bark beetle and other major pests of forest trees before they have reached outbreak proportions in order that appropriate control may be applied before the cost becomes excessive. The Bureau of Entomology and Plant Quarantine is responsible for determining the status of infestations caused by insect pests and for recommending methods of control and means of preventing damage. The funds now available are not sufficient to enable the Bureau to take the lead in conducting surveys to determine insect conditions in forests. Surveys conducted for the purpose of locating incipient infestations of bark beetles are the first and most important step in preventing the occurrence of out-

breaks of those pests, which are annually causing excessive damage and loss of valuable forest trees in forest reservations and national parks and on private timberlands.

The Bureau has been cooperating with other agencies of the Government and private landowners by organizing or conducting surveys and furnishing the technical advice as to methods and measures for the control of outbreaks of native forest insects. Surveys conducted under this arrangement are for the most part made only in areas where the occurrence of important pests of forest trees has been observed by others and brought to the attention of the Bureau. Forest rangers and similar men in the National Park and Indian Service and cruisers for private timber owners are, as a part of their duties, on the lookout for damage caused by insect pests. When they have observed situations which appear to them important, the facts are brought to the attention of the Bureau and frequently are accompanied by a request for a survey of the area and recommendations for controlling the situation. This plan is a valuable aid in locating insect outbreaks and should be continued. It is, however, impracticable for these men to accurately and adequately locate incipient outbreaks. Furthermore, this program, in effect, tends to place the initial responsibility for determining insect conditions on agencies other than the one primarily responsible for the work. While an increase of $14,210 was provided for work of this type in the 1937 Appropriation Act, the funds available for the purpose during that year are still approximately $85,000 less than the amount available for the same purposes in 1932, notwithstanding that the demand for assistance has very greatly increased.

The increase of $35,975 requested for these surveys will provide for the employment of trained men whose business will be to locate insect pests without regard to other activities. It is well known that certain of the outbreaks of forest bark beetles which have caused excessive damage to our native forests have developed from small centers. Such centers of infestation may originate either on public or private lands and spread in all directions favorable to the pest. The prompt location of these incipient infestations and the application of suitable control measures by public or private agencies should very greatly aid in preventing their spread, with resultant excessive destruction. If the infestation is discovered when it is small, the cost incident to control will naturally be less, and in addition to reducing control costs protection will be given to timber which might otherwise be destroyed as the size of the outbreak increases.

(2) <u>An increase of $10,000 for conducting a survey of the European spruce sawfly situation</u>. About seven years ago a very destructive sawfly was discovered in the Gaspe Peninsula in Canada, and over some 5,000 square miles it has destroyed half of the white spruce. Preliminary surveys made during the past season indicate that infestation occurs in New York and all the New England States. This territory contains about 22 million acres of spruce land, supporting a volume of some 25 billion board feet of timber, having an estimated value of 100 to 200 million dollars, and if the conditions existing in Canada are repeated here very severe losses may be expected. The proposed survey is necessary to determine the extent of the infestation, and investigations are needed to determine what practicable measures may be taken to combat the sawfly.

(3) An increase of $8,000 for work on insects attacking shade trees and hardy shrubs. The funds now allotted to this work are inadequate to provide even for handling inquiries from correspondents asking for advice on methods of controlling insects which attack shade trees. Requests for information of this type are received at the rate of about 2,500 annually, and this volume is being augmented by the increased interest in home ownership and beautification of home conditions and sites. These developments also add new problems in the control of insects attacking shade and ornamental trees. The increase recommended will enable the Bureau to bring additional technical resources to bear on these problems and also will provide stenographic assistance badly needed in handling the mass of correspondence.

WORK UNDER THIS APPROPRIATION

General.--This item provides for investigations on insects injurious to forests and forest products to determine methods of control of such pests and for planning and directing campaigns to control serious outbreaks that occur over large forested areas. Investigations to develop methods of control of insects attacking shade trees also come under this item. The activities are divided into the following project groups:

1. Native Forest Insect Investigations.--The work under this project is concerned with investigations on and the control of insects attacking forest trees and forest products. The work is carried on from seven field stations, located either at the regional headquarters maintained by the Forest Service of the Department or at their regional experiment stations. Certain of the important activities under way at present are discussed in the following paragraphs:

The investigations are concerned primarily with the development or improvement of methods for direct control or by combating the pests through forest-management practices. During the past four years several improvements have been effected which have resulted in reducing the cost of control of bark beetles in certain sections from 25 to 50 percent. It is believed that further studies will result in the perfection of methods which will make possible tremendous savings in the application of control operations. The use of oils which penetrate the bark may permit work throughout the dry summer season, and ways of applying insecticides from the air furnish a way for preventing losses by defoliators. Many forest insects can not be controlled by direct methods and must be combated through forest management. Investigations on the white-pine weevil in the Harvard forest have demonstrated that sound silvicultural practices will insure control so that straight timber can be produced. Similar studies are under way in California and Oregon on the control of the Western pine beetle on yellow pine.

Enormous losses occur each year from insects which attack forest products in use. Many different kinds of insects, such as termites, powderpost beetles, various borers, etc., are responsible for these losses. Effective methods for the control of some of these have been devised and are recommended. Continued work is necessary to develop effective methods for controlling other pests for which present measures are not fully applicable. The investigations on termites are of particular importance because of the emphasis placed on

these pests and the many new controls that are being suggested.

The Bureau of Entomology and Plant Quarantine is responsible for recommending to the Forest Service, National Park Service, Bureau of Indian Affairs, and private timber owners when and where to conduct control investigations against important timber-destroying bark beetles or defoliators. To do this it is necessary to make surveys of forests where abnormal insect activities are reported. The information secured from these surveys is used as a basis for recommendations to prepare estimates for control work done by various governmental agencies.

The surveys referred to in the above paragraph are for the most part made at the request of the agency responsible for the management of the land. With the limited increase in funds included in the Act making appropriations for 1937, surveys to locate incipient infestations have been begun in a small way. These are for the most part restricted to the preliminary work of classifying various timber areas into hazard groups, based on the probability of bark-beetle infestation and the need for control work to protect the timber from destruction by bark beetles.

2. Introduced Forest Insect Investigations.--The work under this project deals with investigations on introduced pests of forest trees and is headquartered at laboratories at New Haven, Conn., and Morristown, N.J. It has as its two chief objectives: (1) the control of these introduced insects through the introduction, colonization, and liberation of natural enemies; and (2) the development of effective sprays or dusts which may be used for artificial control.

Accurate information as to the effect of various insecticides is not available in connection with many of the recently introduced pests. Investigations are under way to determine chemicals toxic to these insects, particularly the leaf-feeding forms. These include studies on various materials which may serve as carriers or adhesives for insecticides applied either in liquid or dust form. Special attention is directed to experiments on effective stickers for dusts which can be applied from airplanes.

Studies and observations are made to develop information regarding the occurrence, abundance, and habits of, and control measures effective for various forest insects which have been introduced and for the most part occur only in the New England area. This involves surveys to determine the status of pests, laboratory and field studies on their habits, testing of artificial control measures, and the receipt and colonization of imported parasites. Some of the important pests under study are:

(a) The European spruce sawfly, an important pest which has recently spread into Maine and other adjacent States from the infestation in Canada. This pest has been known to occur in North America for only a few years but has destroyed large areas of spruce and is a threat to the spruce forests of the Northeastern States.

(b) The European pine shoot moth, a pest of increasing importance. Work on it is concerned particularly with the colonization of natural enemies and the development of insecticidal sprays.

(c) The beech scale, an important pest and closely associated with a destructive disease of the beech. Investigations on its biology and habits to develop facts necessary to determine control measures are under way. A few tests have been made to determine the effectiveness of various sprays for its control.

(d) The satin moth, a pest of willows and poplars which occurs in New England and in Washington and Oregon. Studies on it are now largely limited to determining the distribution and effectiveness of parasites which have been imported.

(e) The birch sawfly, a pest which has spread rapidly and attracts considerable attention, particularly in recreational areas, by causing the leaves to turn brown and fall in midseason. Studies are directed principally to the use of parasites and the possibility of control by forest management.

(f) The elm leaf beetle, the Oriental moth, and the larch case bearer, which are pests of considerable importance in limited areas. Work on these is concerned largely with the colonization of natural enemies.

(g) The gypsy moth. Only a limited amount of attention is directed to this insect, one of the better known introduced pests, and studies are largely concerned with the improvement of an attractant for the males and the determination of the effect forest composition has on the abundance of the insect and the defoliation caused by it.

Many of the native insect parasites also attack introduced pests. Information as to the effectiveness, distribution, and habits is necessary in connection with the use of natural enemies as aids for control. The studies also provide for determination of the relationship between the introduced and native natural enemies.

Natural enemies of many of the introduced pests of forest and shade trees are known to occur in the native homes of these pests in Europe and elsewhere. These natural aids in control are being collected and shipped into the United States for colonization. At present special attention is being directed to securing parasites of the European pine shoot moth, beech scale, larch case bearer, and elm leaf beetle.

Various insect pests are responsible for the spread of the Dutch elm disease from tree to tree. It has been determined that an introduced bark beetle and one of the native species transmit this disease from tree to tree. Information on the distribution and habits of these species, particularly as to flight, methods of feeding, and the development of effective ways of controlling them, are of immense importance to the effort to eradicate the Dutch elm disease. It is possible that a number of other native insects which attack elms may carry the disease from tree to tree. Investigations in this field have a very direct bearing on the eradication program. The need for information on insects that may transmit the Dutch elm disease was so great that studies on certain problems have been suspended and adjustments made in other investigations to help provide for this emergency. A laboratory has been established at Morristown, N.J., in cooperation with the Bureau of Plant Industry, where these studies are conducted. In addition to the amount used under regular funds, these investigations are now supported by allotments from funds available for Emergency Conservation Work.

In Europe two species of bark beetles are known to transmit the Dutch elm disease from tree to tree. One of these is established in the United States. To secure facts regarding the habits of this bark beetle, to determine information regarding the other species, to carry on tests to determine whether other insects may transmit the disease in Europe, and to determine other facts on the relation of the insect and the occurrence, spread, and control of the disease, a temporary laboratory has been established in England. The information secured by these investigations has a very important bearing on planning and directing the eradication campaign.

3. Shade Tree and Hardy Shrub Insects.--The activities under this project are restricted to answering inquiries on insects attacking shade trees and hardy shrubs and suggesting means for their control.

4. Investigations on Insect Relation to Azalea Blight.--The flower blight of azaleas is known to occur only in limited areas in certain Southern States. It may be transmitted from flower to flower by certain insects. The disease is evident only for a short time during the spring when the plants are in flower, and the small allotment available for the work is used for studies during this period. These studies are conducted in cooperation with the Bureau of Plant Industry.

EMERGENCY FUNDS

Indirect Allotment

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Conservation Work (authorized by Act of March 31, 1933; allotment through War Department):		
Control of insect enemies of forests.....	$54,795	$33,000

(i) GYPSY AND BROWN-TAIL MOTH CONTROL

Appropriation Act, 1937.....$400,000
Budget Estimate, 1938..... 400,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Inspection and certification for gypsy and brown-tail moth control.....	$98,682	$99,282	$99,282
2. Control operations for gypsy and brown-tail moth control.....	299,446	300,718	300,718
Unobligated balance.....	1,872	- - -	- - -
Total appropriation.....	400,000	400,000	400,000

WORK UNDER THIS APPROPRIATION

General.--This item provides for control work on the gypsy and brown-tail moths and for the inspection and certification of products to meet the requirements of the Federal quarantines for these insects. The work is divided into two projects, as follows:

1. Inspection and Certification for Gypsy and Brown-Tail Moth Control.--The work under this project deals with the inspection and certification of products originating in the quarantined area designated for shipment to points outside. The possibility of the distribution of the gypsy moth over long distances on shipments of products which might carry it is illustrated by records on such shipments. Infestations have actually been discovered on and removed from shipments destined to practically every State in the Union. This inspection and certification covers commodities which are grouped into nursery, quarry, forest, and evergreen products. The certification is based on inspection, and the commodities thus inspected and certified are eligible for interstate transportation. Industries located within the infested area which deal with articles likely to carry these insects are enabled under Federal certification to ship their products in the normal way. If there were no Federal quarantine, State quarantines (which are practically embargoes) would be in effect in nearly every State. Interstate business in such articles would operate under a severe handicap in the face of such a system of State embargoes.

2. Control Operations for Gypsy and Brown-Tail Moths.--The work under this project is concerned with the control and extermination of infestations of gypsy and brown-tail moths which are so located as to be susceptible to spread by natural means to points outside the infested area. This work is carried on in cooperation with State agencies which make material contributions. The activities are carried on in the area immediately outside the known infested section, referred to as the Barrier Zone, and at points beyond where infestation has been found.

The Barrier Zone is an area some 20 to 30 miles in width, extending from Long Island Sound on the south to the Dominion of Canada on the north. This strip of land extends over into New York State for its western boundary and into the New England States for its eastern boundary, the center of the zone being approximately the eastern New York State boundary line. Spread of moths by natural means from the generally infested area in New England into and through the Barrier Zone is controlled by the application of extermination measures in this zone. This requires scouting to locate infestations and their treatment to eliminate colonies which may be found.

Gypsy and brown-tail moths have been kept confined to the comparatively limited area comprising the New England States. The gypsy moth has been found on Long Island and in the Bronx, N.Y., in northeastern Pennsylvania, and in New Jersey. These are the only known infestations for either of these insects outside of New England. The infestation in New Jersey is small and is believed to be due to a colony which was not found and destroyed in the course of previous work there. The nature of the work in these outlying infestations is similar to that employed in the Barrier Zone, consisting of scouting to locate infestations followed by the application of suppressive measures with the object of complete extermination. The infestation in Pennsylvania was found in 1932, and the area involved, as determined by intensive scouting, covered approximately 880 square miles. Not all of the area, however, is infested. Cooperation of the States concerned is an important factor in the progress which has been made in dealing with these infestations.

Large allotments have been made available from emergency funds for the control of the gypsy and brown-tail moths. In addition to providing for operations in sections where work has been conducted with regular funds, the work with emergency funds has provided for control of the gypsy moth in the area east of the Barrier Zone and for control of the brown-tail moth. The supervision of this work is provided for by the organization employed under the regular appropriation. Without this supervision the activities under the emergency funds could not be carried out. The regular organization must be maintained to follow up the work when the relief program is discontinued or reduced.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act, 1935:		
Control and prevention of spread of brown-tail moth	$610,720	$76,530
Control and prevention of spread of gypsy moth	2,394,300	263,950
Total	3,005,020	340,480
Emergency Relief Appropriation Act, 1936:		
Control and prevention of spread of brown-tail moth	- - -	266,000
Control and prevention of spread of gypsy moth	- - -	1,100,000
Total	- - -	1,366,000
Total, Emergency Funds (Direct Allotments)	3,005,020	1,706,480

(j) BLISTER RUST CONTROL

Appropriation Act 1937	$250,000
Budget Estimate, 1938	300,000
Increase	50,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. White-pine blister rust control operations:				
Eastern control program	$119,025	$120,000	$120,000	- - -
Western control program	120,550	120,000	165,000	+$45,000(1)
2. Enforcement of quarantine on white-pine blister rust	7,975	10,000	15,000	+5,000(2)
Unobligated balance	2,450	- - -	- - -	- - -
Total appropriation	250,000	250,000	300,000	+50,000

INCREASE

The increase of $50,000 in this item for 1938 consists of:

(1) An increase of $45,000 for the western control program.--The western white-pine region in the Pacific Northwest and the sugar-pine region of California and Oregon contain nearly five million acres of land upon which pine is an important component of the forest stands. The blister rust is now thoroughly established in the West and was found in California for the first time this year. Its rapid spread threatens to damage such mature timber as is not cut promptly, to destroy the younger trees before they can mature, and to seriously interfere with further reproduction of white pine over these extensive forest areas. At the present time 49 percent of the pine land in the Inland Empire and 17 percent of that in the sugar-pine belt has been protected by Ribes eradication against the rust. It is necessary, however, to continue to check on the protected areas and carry on actual eradication operations in the remainder of the pine lands. The proposed increase will aid in protecting the gains made through programs carried on in the past three years under various allotments of emergency funds and by cooperative programs during the previous ten years. It will permit employment of additional personnel for leadership, coordination, and technical assistance for all the work on white-pine blister rust control in the western area.

(2) An increase of $5,000 in connection with blister rust quarantine enforcement.--An essential feature of blister-rust control work is the maintenance of quarantines to prevent the movement from nurseries of material capable of transmitting the disease. Up to the season of 1936 inspection was being carried on at approximately 45 nurseries from which applications had been filed for permits to ship five-leaf pine interstate under regulations of the quarantine. In 1936, however, applications for inspection and permit service were received from 19 Soil Conservation nurseries and 6 commercial nurseries in addition to those previously handled. Furthermore, blister rust has recently been found in two additional States--Illinois and Indiana--which will necessitate extending the quarantine regulations and providing inspection for nurseries in that area. It is anticipated that 20 to 30 such nurseries will be involved. It will be quite impossible to carry on this greatly increased quarantine-enforcement program with the present appropriation, and the increase requested is the minimum necessary to meet the increased demands. The funds will be applied to the payment of the salaries of one additional full-time inspector and four seasonal inspectors and provide for the travel and operating expenses of this increased personnel.

WORK UNDER THIS APPROPRIATION

General.--Under this appropriation campaigns are in progress for the suppression and control of white-pine blister rust by cooperating with State organizations, counties, towns, individual land owners, and the Forest Service, National Park Service, and Indian Service in the eradication of Ribes (currants and gooseberries), which serve as carriers of the disease, as well as in the application of measures to delay the spread of the disease into uninfected regions.

This work is conducted under two main projects--one concerned with a control program and the other with the enforcement of the Federal quarantine on white pine blister rust.

1. White-Pine Blister Rust Control Operations.--The work under this project provides national leadership for the control of the white-pine blister rust and is carried on in cooperation with the appropriate agencies. For convenience, the work has been divided into two parts--Eastern Control Program and Western Control Program.

(a) Eastern Control Program.--The Department is cooperating in the control of blister rust through formal and informal arrangements with governmental agencies, States, counties, townships, individuals, and other local agencies in the control of white-pine blister rust in white-pine growing regions in Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, North Carolina, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Wisconsin, Maryland, Virginia, West Virginia, Ohio, Illinois, Indiana, Iowa, Tennessee, Kentucky, Georgia, and South Carolina. In this work the Department provides the leadership and coordination of the control activities and the States and their cooperators supply the supervision and labor. The work includes surveys to locate pines and areas where Ribes are growing; supervision of the work for control done by cooperating States, counties, and towns, or with emergency funds available to the Bureau or other agencies for white-pine blister rust control; and checking the eradication work to determine its thoroughness.

The eastern control program must be continued (1) to assure the productivity of white-pine forests containing standing timber valued at over $126,000,000; (2) to preserve regional scenic and recreational white-pine values of great economic importance; (3) to protect thousands of acres of young growth which will form the next timber crop; (4) to maintain control of the disease on initially protected pine lands, aggregating 8,500,000 acres; (5) to apply control measures on the remaining unprotected pine acreage in the infected States; and (6) to extend protection to white pines in disease-free regions as rapidly as they are invaded by the natural spread of the disease. This is a national problem, requiring Federal leadership and technical knowledge to coordinate cooperating agencies.

(b) Western Control Program.--In the western area, the control of white-pine blister rust is carried on in California, Idaho, Montana, Oregon, Washington, Wyoming, and Colorado. In this area the Department assists cooperating State and local agencies in the application of control measures on State and privately-owned lands and furnishes leadership and technical assistance in coordinating the control activities carried on in these areas by the Forest Service in protecting valuable white pines in the national forests, and to the National Park Service and Indian Service in protecting valuable areas of white pines in national parks and on Indian reservations. The forested lands in this area are of mixed ownership, and control can be accomplished only by combining and coordinating efforts of all owners into a single program. The work will include surveys to locate pines and areas where Ribes grow; application of methods of eradicating Ribes plants; supervision of control work done in the national forests and national parks and on private lands with funds supplied from other sources; and checking to determine the status of the control work.

The blister-rust control program in the western United States must be continued (1) to assure the productivity of forest lands bearing western white-pine and sugar-pine timber valued at $288,000,000 and thus maintain industries dependent upon the white pine, which represent 50 percent of the business of the western white-pine region, as well as valuable economic and business interests in the sugar-pine region of California; (2) to protect millions of acres of young growth that will form the next timber crop; (3) to prevent forced timber cutting and demoralization of the Nation's lumber markets; (4) to maintain control of the disease in areas already protected; (5) to apply control measures on the remaining unprotected areas; (6) to preserve the scenic and recreational white-pine values of great economic importance; and (7) to extend protection to white pines in uninfected regions as rapidly as they are invaded by the natural spread of the rust.

2. Enforcement of Quarantine on White-Pine Blister Rust.--The work under this activity is concerned with the enforcement of the Federal quarantine on account of white-pine blister rust. For the most part this work consists of (1) inspecting the premises and environs of nurseries in which pines susceptible to the disease are grown; (2) preventing the interstate shipment of rust-infected pines or currant and gooseberry plants likely to carry the disease and not meeting the requirements of the Federal quarantine; and (3) cooperating with nurseries, etc., in the protection of pine nursery stock against exposure to blister rust.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act of 1935:		
White-pine blister rust control.....	$3,539,985	$867,819
Emergency Relief Appropriation Act 1936:		
White-pine blister rust control.....	- - -	2,500,000
Public Works Allotments (National Industrial Recovery Act): White-pine blister rust control..	7,485	- - -
Total, Emergency Funds (Direct Allotments)...	3,547,470	3,367,819

(k) DUTCH ELM DISEASE ERADICATION

Appropriation Act, 1937.....(a)	$261,156
Budget Estimate, 1938.....	500,000
Increase.....	238,844

(a) Of this amount, $11,000 was obligated under immediately available authority in 1936.

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Dutch elm disease eradication:				
Scouting to locate the Dutch elm disease.....	$164,474(a)	$164,100(b)	$320,664	+$156,564(1)
Identification of disease in trees suspected to be infected with the Dutch elm disease.....	36,750	37,000	41,000	+ 4,000(2)
Enforcement of quarantine on Dutch elm disease.....	4,960	5,000	5,000	- - -
Coordination of State work on the Dutch elm disease...	54,846	55,056	55,056	- - -
Removal of diseased, dead, and dying trees.....	- - -	- - -	78,280	+ 78,280(3)
Unobligated balance.....	126	- - -	- - -	- - -
Total appropriation.....	261,156(a)	261,156(b)	500,000	+238,844

(a) Includes $25,156 obligated in 1935 and $6,000 transferred to "Forest Insects", and excludes $11,000 obligated in 1936 out of 1937 appropriation made immediately available.
(b) Includes $2,700 transferred to "Forest Insects" and $11,000 obligated in 1936.

INCREASE

An increase of $238,844 in this item for 1938 consists of:

(1) An increase of $156,564 for additional scouting work to locate the Dutch elm disease.--The origin of the Dutch elm disease in this country has been traced rather definitely to the importation of elm burl logs imported for furniture veneer manufacture. These logs were found to be infested with the insects known to carry the disease and to be infected with the disease organism itself. When this information was obtained, entry of the logs was prohibited by quarantine action. It is believed insects emerged from the logs at ports of entry, along rights-of-way over which the logs were transported, and at the utilization points while the logs were waiting to be used.

The major known diseased area in the vicinity of New York harbor includes an area extending approximately 50 miles in the States of Connecticut, New York, and New Jersey. In this area, where the disease has been found to be somewhat generally distributed, it is necessary to make repeated scoutings in order that trees may be found as soon as they show the first external symptoms of infection. In the early stages of the development of the disease it is believed that little or no danger of spread from an infected tree has occurred and that its destruction, if accomplished promptly, kills out that possible center of infection and spread before it has had time to develop. The known method of spread of the disease at the present time involves two species of bark beetles. The bark beetles breed in dying elms and the next generation emerges to go to healthy trees in search of food. The Dutch elm disease kills the trees rapidly, and soon after becoming infected they reach a stage where they are attractive to the beetles. It is this period of time which occurs between the first visible symptoms of the infection and the time when the first brood of beetles could emerge from such a tree that presents the possibility of eradication by the searching for and prompt destruction of diseased trees. The scouting program can best be carried on when the trees are in foliage, and the best months of the year are those in the early summer before the foliage has become injured by various causes, so that symptoms such as wilt or discoloration are readily noticeable. The presence of wilt or discoloration in the leaves is the most striking and characteristic symptom, and when noticed it is followed by further examination. Twigs from the affected part of the tree are cut and examined for discoloration in the wood immediately beneath the bark. If the discoloration is present, samples are taken from the tree and sent to the laboratory where cultures are made, and if these give a positive reaction the tree is marked for destruction. In addition to scouting this so-called generally infected area, scouting is also being carried on in the vicinity of the ports of entry where logs have been brought into this country and along rights-of-way and in the vicinity of veneer factories where this material is known to have been used.

In the New York, New Jersey, and Connecticut infested region scouting is also carried on over an area of about ten miles wide surrounding the outer infected points. It is believed this is sufficient to make sure that the disease is kept within the known limits. No curative remedy for diseased trees is known, and no method of eradicating the disease has been found other than the prompt removal of diseased trees. This places primary emphasis on the scouting which must be accurate, thorough, and frequent. The increase requested is the minimum adequate to insure effective scouting.

(2) <u>An increase of $4,000 for the laboratory examination and identification of suspected trees</u>.--The elm is subject to a number of diseases which produce symptoms superficially similar to those of the Dutch elm disease. The only way to diagnose the disease with certainty is by laboratory examination of samples of trees suspected of being infected. Scouts examine all elm trees in areas under observation, looking particularly for external symptoms such as wilted or discolored foliage. If such symptoms are found, further examination is made and, if some other definite cause for the condition is not discovered, samples are taken, carefully marked to preserve identity, and sent to the laboratory. At the laboratory they are carefully prepared for culturing, and each sample is given a number which stays with it throughout the laboratory procedure. If the cultures are positive, the tree is tagged for immediate destruction. If any particular circumstances should arise to make it necessary, a second culture is made as a check on the first, but

under ordinary conditions a positive result from the first test is considered conclusive evidence of the presence of the disease. It takes approximately five days to prepare and obtain results from these cultures. As soon as the presence of the disease is confirmed, representatives of the State concerned interview the property owner to obtain his permission to destroy the tree, and its destruction follows as promptly as may be. However promptly these arrangements may be carried out, a definite period of five days is required to determine the presence or absence of the disease in a given tree. It is essential, therefore, that this laboratory examination of samples submitted by the field men keep pace with the work being done by the field men. Maximum precautions to prevent the possible contamination of samples or cultures must be taken at all times in the laboratory, and skilled operators are needed to maintain volume under the necessary precautions to insure accurate and prompt determinations. The increase requested is needed for additional personnel to keep pace with the work.

(3) An increase of $78,280 for work in the removal of diseased, dead, and dying elm trees.--As soon as the presence of the Dutch elm disease in a given tree is confirmed, representatives of the State at once institute proceedings to obtain permission for the removal of the diseased tree. They operate under the police power of the State, and their procedure is to secure permission from the owner for the destruction of the tree, and only when all efforts to obtain permission fail do they resort to legal means. As soon as permission is obtained, the destruction of the tree is accomplished as rapidly as possible. If the tree is growing in an open situation where it can be felled and burned, the operation presents a minimum of difficulty. If the tree stands in a crowded residential area or on a busy street or is involved with wires and other entanglements, the undertaking becomes more complex and in some cases the trees have to be cut limb by limb, lowered to the ground, and the parts taken to some convenient spot where they can be burned.

As soon as a tree begins to show wilt from the presence of the Dutch elm disease it rapidly assumes a condition which makes it attractive to the bark beetles. These insects then enter the bark and breed there, and the next generation emerging makes a particularly favorable opportunity for the dissemination of the disease. The time available for determining the presence or absence of the disease and for the destruction of a given tree is a matter of weeks, being the period during which the tree becomes attractive to the beetle and the interval during which a brood may develop. Therefore, it is imperative for the success of the eradication that the destruction of diseased trees keep pace with the finding of such trees.

Before the Dutch elm disease work began it was known that trees in an unthrifty condition were sought by the bark beetle for breeding places. It has since been learned that a rather high percentage of unhealthy, dead or dying elm trees is infected with the disease. Such trees have little, if any, value, and a program for the destruction of dead and dying elm trees in the generally infected area was undertaken. The increase recommended for this activity would be used for continuing the destruction of dead and dying elms, in addition to the destruction of diseased trees. This work differs from that involved under the consideration of diseased trees in that there is no determination as to the presence or absence of the disease. Scouts locate trees in which there are substantial amounts of dead or dying wood. State

representatives contact the owners and, if possible, secure permission for the removal of such trees. In some areas where the disease has been prevalent for some time as high as 20 percent of the trees thus removed have been found to be affected by the Dutch elm disease. This figure was obtained by making cultures of as many as 100 trees taken at random in an area where general cutting was under way. Substantial progress has been made in the removal of dead and dying elms in the generally infected area through the use of emergency funds. More than one and a quarter million such trees had been removed up to June 1, 1936, and their removal destroys an attractive breeding spot for the beetle, destroys a particularly susceptible host for the disease, and saves the cost of repeated examinations which need to be made of such trees.

CHANGES IN LANGUAGE

The language of this item has been amended to agree in general phraseology with that of other items authorizing activities for the control or eradication of major plant diseases, including the addition of the following proviso with reference to State and local cooperation: Provided, That, in the discretion of the Secretary of Agriculture, no expenditures from this appropriation shall be made for these purposes until a sum or sums at least equal to such expenditures shall have been appropriated, subscribed, or contributed by State, county, or local authorities, or by individuals, or organizations concerned.

WORK UNDER THIS APPROPRIATION

This appropriation deals with the eradication of the Dutch elm disease in the United States and is used for activities concerned with its eradication and the enforcement of the domestic quarantine to prevent its spread into uninfected regions. The activities consist of scouting to locate infected trees, identification of the disease in trees suspected of being infected, and cooperation with State and local agencies in the removal and destruction of infected trees and those which are potentially dangerous, coordination of the State work, and supervision of the work carried on with emergency funds. The funds so far provided by regular appropriations have not been used for the removal and destruction of infected trees. Work of this type has, however, been carried on under allotments of funds from emergency relief appropriations. It is now proposed that a part of the regular funds requested for 1938 be used to cooperate with States in tree removal and destruction.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act, 1935:		
Eradication of Dutch elm disease.....	$2,651,888	$194,949
Emergency Relief Appropriation Act, 1936:		
Eradication of Dutch elm disease.....	- - -	2,732,000
Total, Emergency Funds (Direct Allotments).	2,651,888	2,926,949

(1) TRUCK CROP AND GARDEN INSECTS

Appropriation Act, 1937.....	$366,418
Budget Estimate, 1938.....	381,580
Increase.....	15,162

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. Truck crop insect investigations.....	$170,881	$173,981	$189,143	+$15,162(1)
2. Berry insect investigations.	11,071	11,147	11,147	- - -
3. Sugar-beet leafhopper investigations.....	73,990	74,390	74,390	- - -
4. Tobacco insect investigations.....	63,600	63,900	63,900	- - -
5. Insects affecting greenhouses and ornamental plants.....	39,900	43,000	43,000	- - -
Unobligated balance.....	1,976	- - -	- - -	- - -
Total appropriation.....	361,418	366,418	381,580	+15,162(1)

INCREASE

(1) The increase of $15,162 for 1938 will provide for expanding the investigation of pea insects in the Pacific Northwest and for studies in the control of tomato insects, as follows:

(a) $10,162 for investigations on insects attacking peas. The pea weevil is a serious pest to producers of peas. Formerly it was considered to be important mainly as a pest of the dried pea. The first brood of the pea weevil, however, lays its eggs in the developing pods, and the larvae attain their maximum growth before the peas have reached their full size. Larvae may therefore be present in various sizes in fresh peas produced either for canning or for shipment to market by the cold process method. Recently there has been a marked expansion of the marketing of peas produced in the Pacific Northwest by the cold process method. There has also been a very great expansion and development in the canning industry of the Northwest. The presence of the pea weevil in the canned peas has caused food officials to condemn these products. In recent years losses caused by the presence of weevils in canned and cold processed peas have been very heavy, particularly in those produced on the western slope, and especially in the Willamette Valley of Oregon. The importance of the pea weevil as a pest of dried peas is continuing, and the investigations under way on that aspect of the work can not be interrupted to give attention to this new phase of the problem. It is especially important that the investigations on the pea weevil be expanded and an effort made to develop ways of combating the pest to prevent the infestation in green peas.

The production of green peas in the Pacific Northwest has also emphasized the need for more satisfactory methods for control of the pea aphid during seasons when it occurs in outbreak numbers. Attention will be given to this insect and the work correlated with that done in other areas. These activities will, because of the interrelations of the various problems, be handled in relation to and as part of the activities on pea weevil.

Limited parts of the Pacific Northwest, and particularly in Snohomish and Skagit Counties in Washington, have recently been invaded by a new and important pest of peas. This insect is a moth, the larvae of which feed within the pods, causing material losses to the growing crop and, when heavy infestations occur, practically prohibiting the production of seed. Effective controls are not known for this pest, and it is important that investigations be undertaken to determine additional necessary facts regarding it. The Bureau has not conducted any studies on this pest but has cooperated with State agencies by sending a few trial shipments of a native parasite which may aid in its control. The effort to determine the practicability of the use of parasites as aids in control should be expanded, and a limited part of the proposed increase will be used for this purpose.

(b) $5,000 for investigations on tomato insects. The tomato fruit is attacked by two important insect pests, which cause very heavy annual losses. One of these, the tomato pinworm, has only recently been discovered in the United States. It is, however, now well established in southern California, where losses have been reported to have prevented the marketing of 40 percent of the crop. It has more recently been found in Florida and Mississippi and is known to occur as far north as Pennsylvania, where it is particularly destructive to tomatoes produced in greenhouses. During the

past two years it has prevented the marketing of approximately 50 percent of the tomatoes produced in greenhouses in the Kennett Square section of Pennsylvania. The larvae enter the tomatoes while the fruit is young and mine in there until they are mature.

The other important pest of the fruit is the tomato fruitworm, a cospmopolitan insect which attacks large varieties of crops and is also known as the corn earworm. This pest is particularly destructive to tomatoes in the Southern States but also causes material losses in the tomato-producing sections of California, Utah, Indiana, Ohio, Illinois, and parts of the eastern Coastal Plain. During the past season 20 percent of the tomatoes produced in Utah and delivered to canneries were infested with this insect. In the Santa Clara Valley of California the infestation was as high as 37 percent. Similar losses are recorded from other areas, particularly parts of Texas and other cotton-producing States. The young larvae enter the tomatoes and remain there until they complete their development. The entrance holes made by the small larvae are very difficult to detect. The presence of these insects or parts of them in canned or processed tomatoes has caused food officials to condemn large quantities of canned products.

In many parts of the eastern sections of the United States, particularly in the Atlantic Coastal Plain, the tomato hornworm may cause complete loss of the crop by destroying the foliage.

Effective controls are not available for any of these pests. The use of many kinds of standard insecticides can not be recommended because of objectionable residues, and this materially complicates the problem of control. The fact that the larvae enter the fruit while young further complicates control measures. A very thorough investigation is necessary to determine the habits of the insects under varying conditions and to test insecticidal materials which may be useful in control. Comparatively little attention has been given to these problems, the importance of which was partially recognized by the increase of $5,000 included by Congress in the Act making appropriations for the fiscal year 1937. The proposed increase of $5,000 for 1938 will be used for needed investigations in the western area where the problem is especially pressing.

WORK UNDER THIS APPROPRIATION

General.--The work under this subappropriation deals with the study of insects and the development of means for control of the forms injurious to truck crops and garden plants, including vegetables, flowers, bulbous plants, potted ornamentals, and plants grown under glass, as well as such related crops as strawberries, raspberries, blackberries, sugar beets, and tobacco. It also provides for investigations on the European earwig, pests of mushrooms, and soil insects such as wireworms and white grubs attacking vegetables. Field laboratories are maintained in certain of the more important trucking regions and in localities where bulbs and other ornamental plants are produced.

1. Truck Crop Insect Investigations.--These activities are concerned with insects affecting truck crops such as beans, peas, melons, potatoes, sweet potatoes, onions, cabbages, etc. Investigations are now being conducted on the European earwig in the Pacific Northwest, cucumber beetles, pepper weevil, vegetable weevil, Puerto Rican mole cricket, pea aphid, sweetpotato weevil, celery leaf-tier, and various wireworms and white grubs injurious to truck crops. Certain phases of these investigations are prosecuted in cooperation with the Bureau of Plant Industry and the Bureau of Agricultural Engineering. The studies are carried on at seventeen field laboratories located in various parts of the country. For the most part the investigations conducted at a laboratory cover a variety of problems and the laboratory may be considered as regional headquarters for work on truck crop pests. For example, the pests of cole crops are studied at five different stations.

The determination of satisfactory methods for the control of insects affecting vegetable and garden crops has assumed greater importance in recent years than at any time in the past. The development and expansion of the vegetable industry in the South and Southwest, the increased consumption of green food products, and the demand that these be free from insect damage and insecticidal residues are factors which have contributed to the increasing importance of this work. With the concentration of crops in certain areas old pests have increased in abundance and distribution. The pepper weevil, previously known in the country only in the West, has recently been discovered in parts of Florida. The tomato pinworm has been found in new areas and is causing heavy losses. Certain recently introduced pests, such as the Puerto Rican mole cricket and the vegetable weevil, are causing damage over larger areas. The mole cricket is proving to be an especially destructive pest in parts of the Atlantic Coastal Plain where it injures seed beds by its habit of tunneling through the soft soil. No fully effective control is yet known, the baits suggested are only partly effective, and more work is necessary on the habits of the cricket before the baits can be greatly improved.

Many of the remedies which have been developed for the control of certain pests of truck crops involve the use of insecticides containing arsenic. Where heavy infestations occur the pests can not be satisfactorily controlled without leaving excessive residues. This coupled with the careless use of insecticides by growers emphasizes the need for the development of control methods which will not leave harmful residues.

The activities under this project cover a wide variety of pests and crops. They affect not only the work of large industries, including canners and producing and marketing agencies of important food crops, but also practically all home gardeners. The interest in home gardens has been greatly expanded, and with it there is an increasing demand for information on the control of insect pests and an appreciation for the use of remedies which will not leave objectionable spray residues.

2. Berry Insect Investigations.--The work under this project is concerned with the study of insects injurious to the small fruits known as berries, including strawberries, raspberries, blackberries, etc. Work is carried on at two field laboratories, one at Puyallup, Wash., for problems in the Pacific Northwest, and one at Chadbourn, N.C., for problems in the

strawberry sections of the eastern Coastal Plain. In the Pacific Northwest special attention is being given to the development of measures to control the raspberry fruitworm and the raspberry mite. The work on these two pests is directed to the application of insecticides which do not leave objectionable residues and the method of applying them so they will be effective. Other important problems await study. Recently a European pest which attacks the ripe strawberry just beneath the cap has been causing damage in parts of the Pacific Northwest. The occurrence of large numbers of minute insects called thrips in cans of raspberries and related fruits produced in the Pacific Northwest emphasizes the need of studies to determine methods of controlling this pest, the occurrence of which has recently attracted particular attention.

At the Chadbourn laboratory in the eastern Coastal Plain special attention is being devoted to the control of the strawberry weevil and the strawberry root aphid. Work on the root aphid, which causes material losses and is apparently associated with one of the important strawberry diseases, is carried on in cooperation with the Bureau of Plant Industry. When the strawberry weevil occurs in such numbers that it can not be controlled by cultural practices, it is necessary to apply insecticides. The present investigation is concerned largely with the use of derris and pyrethrum, which do not leave objectionable residues.

3. Sugar-Beet Leafhopper Investigations.--The sugar-beet leafhopper is the most important pest of sugar beets in the western part of the United States and also damages vegetables. The periodic attacks of this insect result in almost complete failure of beets, tomatoes, beans, and squashes in certain areas and cause marked reduction in the yields every year. The leafhopper transmits the destructive disease known as curly top. One insect may transmit the disease to a number of plants. The leafhoppers invade fields in large numbers in the migration periods, and direct control in the fields has not been found practicable. The work on this insect in the different sections varies in scope and is divided into two work projects.

In the Intermountain Region the investigations are carried on from laboratories at Twin Falls, Idaho, Grand Junction, Colo., Phoenix, Ariz., and Salt Lake City, Utah. They consist principally of surveys made to determine the abundance of the beet leafhoppers and the availability of their favorite host plants in their natural breeding areas, studies to determine the value of sprays and trap crops, field studies and surveys to outline the main breeding areas, and modification of these due to natural or artificial causes.

In California the studies are concerned with the determination of the value of spraying wild host plants, with the elimination of breeding areas as a means of control, and the relation that populations of the leafhopper have to damage to tomatoes and other truck crops and the production of beet seed.

4. Tobacco Insect Investigations.--This work is concerned with the study of insects injurious to tobacco both in the field and in storage. It involves studies of the life history, habits, and methods of control of such insects by the use of insecticides, attractants, baits, fumigants,

cultural practices, etc. The activities are divided into four work projects, three of which are closely related, as they are concerned with insects attacking tobacco in the field.

The work on insects attacking tobacco in the field is now carried on in three of the main areas which produce various types of tobacco. The work in the dark fire-cured area is located at Clarksville, Tenn; that in the flue-cured area at Oxford, N.C., supplemented by seasonal work at Florence, S.C.; and that on insects attacking shade-grown tobacco at Quincy, Fla. Satisfactory treatments that will not leave objectionable residues are not available for the control of many of the important pests, such as the hornworm and flea beetle. There is also some danger to tobacco users from insecticidal residues that may occur on the marketed product. Concerns purchasing tobacco for manufacturing purposes are giving attention to the amount of visible residue that may occur. This emphasizes the need of the development of controls which will eliminate objectionable residues.

In the dark fire-cured area tests are under way to determine the practicability of the use of poison-bait feeders as an aid in the control of the hornworm moth. Experiments to determine the effect of such insecticides as derris are also under way, as well as studies to determine the possibility of using pyrethrum or other organic compounds. The type of bait most effective for the control of the sod webworm is also receiving some attention.

During the past season work in the flue-cured area has, for the most part, consisted of a survey to determine the abundance of the principal insect pests. Funds for work in this section did not become available until the active season was well under way, and it was then not practical to start any intensive experiments for determining the value of various controls. Tests to determine the practicability of control by cultural practices are, however, being given consideration.

In the shade-grown section the most important pest is the tobacco flea beetle. The practicability of using barium fluosilicate has been tested, and during the past season particular attention has been directed to the use of derris and cube dusts. Preliminary results indicate that it is practicable to control this insect, at least in seed beds, by the use of these materials. Attention is also being directed to the methods of control of the tobacco thrips.

Investigations on insects affecting tobacco in storage, which have been under way for a few years, were undertaken in response to the demand of the tobacco trade of the United States. They are chiefly concerned with the development of methods of controlling the recently introduced tobacco moth and the tobacco beetle in both the closed and open type of warehouses. Some very useful and interesting information has been secured and such conclusions as to control measures as have been developed have been made available to the trade. Aside from the protection of tobacco produced within the United States, these investigations have a bearing on the production of a product sufficiently free from insects to meet the requirements of countries to which American tobacco is exported. The infestation in closed storages can be materially reduced by the use of traps and fumigants. It is not practical to apply these

methods in the open storages, and studies are being made to determine other measures of control such as the use of contact sprays. The practicability of using low temperatures is also being studied.

5. Insects Affecting Greenhouse and Ornamental Plants.--This project deals with investigations to determine methods for controlling insects attacking flowering garden plants such as narcissus, tulip, dahlia, etc., and household and ornamental plants; insects injurious to flowers and all kinds of plants grown under glass; and insects injurious to mushrooms. There are many pests of these plants, and in many cases the control which may be used successfully on one kind of plant can not be used on other kinds. In determining controls for a given insect pest it is necessary to test them on most of the kinds of plants attacked and to study the control in relation to the culture of the plant. Some of the pests of greenhouse and ornamental plants now receiving special attention are (1) the cyclamen and broad mites--insects extremely difficult to control which, according to a conservative estimate, cause annual losses to greenhouse interests approximating one million dollars; (2) insect vectors of important mosaic diseases of rose and narcissus; it seems likely that certain of these diseases are transmitted by insects which may be fairly easily controlled; (3) the iris thrips, a widely distributed pest especially difficult to control where the tubers are left in permanent locations; (4) the greenhouse red spider, a pest which attacks a wide variety of plants and causes losses throughout the country; (5) the gladiolus thrips--a limiting factor to the successful production of this favorite garden flower; (6) bulb mites; there are a number of mites which seriously injure narcissus bulbs and flowers for which satisfactory control measures are not available, and additional facts are needed before all varieties of bulbs can be disinfected to eliminate mites; and (7) narcissus bulb flies; effective methods for disinfecting narcissus bulbs have been developed, but present methods of controlling the pest in the field are not fully effective.

The most important pest problems confronting the producers of mushrooms are maggots and mites. The control measures now available to the commercial producer are not fully effective. Conditions that must be maintained in the house for the satisfactory growth of mushrooms make it difficult to fumigate. Mite control is especially difficult because the fumigants ordinarily used do not penetrate the compost and reach the mite without injury to the mushroom. A sulphur burner has recently been devised which materially increases the opportunity for using sulphur in fumigating houses. Progress has also been made in the development of light traps. Further work, however, is necessary to make these results available to the producer. The chemical problems are being studied in cooperation with the Insecticide Unit.

(m) CEREAL AND FORAGE INSECTS

Appropriation Act 1937.....	$372,229
Allotment to "Foreign Parasites" (collecting and introducing into this country of natural enemies of various insect pests of cereal and forage crops).....	-7,900
Total available 1937.....	364,329
Budget Estimate 1938.....	364,329

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Cereal and forage insect investigations	$251,414	$253,214	$253,214
2. European corn borer investigations	78,768	78,968	78,968
3. Sugarcane and rice insect investigations	32,010	32,147	32,147
Unobligated balance	2,137	- - -	- - -
Total appropriation	364,329(a)	364,329	364,329

(a) For 1936, includes $25,000 of the unexpended balance of 1935 appropriation for "Grasshopper Control" reappropriated for a grasshopper survey in 1936; and excludes $7,900 allotted to "Foreign Parasites", set up as a new item in the Estimates for 1938.

CHANGE IN LANGUAGE

The language of this paragraph has been amended to eliminate the phrase "including not exceeding $15,000 for investigation of the means of control of the Mormon cricket". Requirements recently issued by the Comptroller in reference to establishing accounting records for all specific limitations make it necessary to keep essentially the same bookkeeping records of allotments and expenditures for work on Mormon crickets as is done for a separate appropriation. The words recommended to be deleted were initially inserted in the Agricultural Appropriation Act for the fiscal year 1936 when the amount of the item "Cereal and Forage Insects" was increased by $7,500 for investigations on the Mormon cricket. The amount allotted to investigational work on the Mormon cricket has been somewhat less than $15,000. The inclusion of this phrase in the language of this paragraph accomplishes no useful purpose and makes it necessary to keep accounting records on an activity treated by the Department in the same manner as other work projects.

WORK UNDER THIS APPROPRIATION

General.--Investigations under this item are concerned with the development of effective and economical means of controlling insects affecting cereal and forage crops, including sugarcane and rice. The production of cereal and forage crops is the most important agricultural activity over a large part of the United States. The insects attacking these crops annually cause immense losses, and in some areas crops may be completely destroyed by these pests. The investigations are conducted under three projects, one of which is concerned with studies on the European corn borer. Field laboratories are located in the important crop areas.

1. Cereal and Forage Insect Investigations.--These activities are concerned with investigations to develop effective and economical means of controlling insects affecting corn, small grains (except rice), and forage crops. There are hundreds of kinds of insects which attack these crops.

Some of them are injurious to both cereal and forage crops while certain others limit their activities to certain types of crops. The work now under way is separated into work projects, which are discussed below;

The Hessian fly is the most important single insect pest of wheat. The amount of damage done each year varies with conditions. Surveys are conducted in cooperation with State agencies to determine the status of the pest and give timely information concerning control measures. Investigations are being conducted in cooperation with the Bureau of Plant Industry at certain State experiment stations to determine the varieties of wheat that are resistant to attack. An effort is being made to introduce certain parasites that occur in Europe and are not known to be established in the United States, and to redistribute parasites already established in certain areas in sections where they do not now occur and may be of benefit. The work on the Hessian fly is carried on at Carlisle, Pa., La Fayette, Ind., Manhattan and Wichita, Kans., and Sacramento, Calif.

The Southwestern corn borer occurs in Arizona, New Mexico, and the western part of Texas. More recently it has been discovered as far north as Kansas and apparently is invading new areas in this general region. For a number of years it has been studied in the infested area, particularly in Arizona. The information assembled as a result of these investigations has led to the development of controls which appear to meet the present need. Special studies on this pest were conducted during the past fiscal year. The work was directed from the station at Tempe, Arizona.

The chinch bug is one of the important pests of corn, small grains, and other grass-like plants and occurs generally throughout the eastern half of the country. In favorable years it causes excessive losses. The studies on chinch bugs include those directed to determining varieties of corn and sorghum resistant to attack. These are conducted in cooperation with the Bureau of Plant Industry and certain State experiment stations. Those concerned primarily with the insect itself deal with the development of more effective measures to prevent the migration of the immature bugs from small grains to corn, the development of methods for determining chinch bug abundance, the determination of the effect of winter burning of grasslands, and the determination of the value of trap crops near small grains and the effect that agronomic practices have on the abundance of the bugs. The work is headquartered at stations at La Fayette, Ind., and Manhattan, Kans.

The corn earworm is the most destructive generally distributed insect enemy of corn in the United States and occurs throughout the country wherever corn is grown. No satisfactory control is known either for field or sweet corn. Studies so far indicate that indirect methods may be useful in reducing the losses in field corn and that certain direct methods such as the application of insecticides may be effectively used for its control in sweet corn. Previous observations suggest that certain characters of the husk may offer partial immunity from attack. Studies are being made on varieties and strains to determine whether it would be practicable to carry on intensive breeding to produce relatively non-susceptible varieties. Because of the importance of the corn earworm the work on this pest has been reorganized and coordinated so as to place special emphasis on the effort to develop effective controls. The activities of the State experiment stations and of other units of the Bureau of Entomology and Plant Quarantine which study it when it attacks

other crops are being coordinated into a cooperative program. The field work on this insect as a pest of corn is directed from a laboratory at Urbana, Illinois, and special studies are carried on at Arlington Farm, Va., La Fayette, Ind., and New Haven, Conn.

The range caterpillar is a native insect occurring in considerable sections of the Southwest, being particularly abundant in New Mexico where it seriously reduces range grasses, resulting in heavy losses to sheep and cattle producers in that area. Studies to determine the effect of native parasites, particularly their colonization in large numbers, indicate that this method of control would be impracticable in years of heavy outbreak. It may, however, be feasible to use such natural controls to prevent the building up of heavy infestations. Studies are now under way to determine the relation of the caterpillars to climatic conditions and the abundance of the parasites, as well as the effect of various climatic and vegetational factors on outbreaks. This work is headquartered at Tempe, Arizona, and much of the actual operation is carried on during the active season from a substation at Las Vegas, New Mexico.

There are many different species of insects which attack small grains and grasses. Among those which are now being studied are the black stem sawfly, the European wheat sawfly, joint worms, straw worms, etc. During the past two years the European wheat sawfly has occurred in outbreak numbers over considerable areas in Ohio and Pennsylvania and caused marked losses to wheat. An effort is being made to colonize an introduced parasite which materially aids in the control of this pest in Europe and is now being established in parts of Canada. The work is conducted from a number of laboratories. Those at Carlisle, Pa., and Sacramento, Calif., have during the last year directed special attention to these various pests.

The sunflower is an important crop in portions of Illinois, Missouri, and New Mexico, and has been used as a substitute in cases of corn failure, particularly in areas along the river bottoms. Sunflower seed has been made practically worthless for oil production because of severe insect infestations. The pressing of oil from sunflower seed has been practically discontinued in the Illinois and Missouri areas because of the heavy losses caused by insects. Considerable data are available on the habits and development of the more important insect pests and the work now under way is concerned primarily with the testing of methods of control under field conditions. Most of these field studies are conducted in Missouri. The field laboratory at Webster Grove, Missouri, where the work was previously headquartered, has recently been consolidated with the one at Urbana, Illinois.

There are many different kinds of insects which carry diseases of cereal and forage crops. At present particular attention is being directed to those insects which are thought to be carriers of the Stewart's disease of corn. It has been definitely determined that at least two species of flea beetles transmit this disease and that certain other species of insects carry the disease over the winter. It is probable that these insects are the main source of carriers of the disease in the field. This work is headquartered at the laboratory at Arlington, Virginia.

The alfalfa weevil is an introduced pest which occurs in a number of Western States. It has caused material losses in many sections and because of its importance has been the subject of State quarantines on the movement of alfalfa. During the recent drought years these quarantines have been of special importance because of the restrictions on the movement of hay. Studies on the alfalfa weevil are concerned with surveys to determine spread and occurrence, treatments that may be given to hay to eliminate the weevil, and the effect that indirect methods of control--such as proper timing of cuttings--have on weevil abundance and damage. This work is headquartered at Salt Lake City, Utah, and studies are also carried on at Medford, Oreg., and Grand Junction, Colo.

The alfalfa aphid causes severe losses in a number of the Middle Western and Western States which produce alfalfa. Its abundance is somewhat periodic, particularly in the Pacific Northwest. Direct control by insecticides appears impracticable. During the past two years certain strains of alfalfa have been discovered which are highly resistant to aphid attack. The study of these and other strains is now under way with the cooperation of the Bureau of Plant Industry and State experiment stations. Certain fungi attack the alfalfa aphid, and work is being done to determine whether it is possible to utilize diseases in field control. The work is carried on at Forest Grove, Oreg., Manhattan, Kans., and Sacramento, Calif.

There are a number of insects which attack alfalfa and clover seed or interfere with its development. One of the most important is the alfalfa seed chalcid. An effort is being made to determine why recommended methods of control are ineffective in certain localities in the West where this pest is important. These studies require a determination of the relation of grasses and other vegetation to the presence of the pest in fields where seed is produced. This work is headquartered at Tempe, Arizona.

The various forage crops are attacked by many different insects. One of the pests now attracting considerable attention is the hairy vetch bruchid, an introduced insect at present limited to the central Atlantic States, where it has caused high losses in seed production, in some counties as much as 50 percent of the entire crop. This insect lives in and may be transported in the seed, and certain areas where vetch and similar crops are produced for seed are in need of information on control measures and ways of treating seed to prevent the spread of this pest. Other important insects which attack forage crops are the western spotted cucumber beetle, and important pest of alfalfa and clover seedlings in the Pacific Northwest, and the various leafhoppers which attack alfalfa and often cause heavy losses in the yield and reduce the vitality of plants so that they are injured by winter killing. Studies on miscellaneous insect pests of forage crops are directed from field laboratories at Arlington, Va., Forest Grove, Oreg., and Carlisle, Pa.

The importance of grasshoppers as pests of practically all kinds of cereal and forage crops has long been recognized and was again recently demonstrated by the extensive outbreaks in 22 States. There are many different species of grasshoppers that may occur in such abundance as to do excessive damage. When all the various kinds are abundant during the same season losses may be very great. Various species of grasshoppers differ in their habits, particularly as to associations favorable for egg-laying and

the reaction to various baits. The kinds which usually are present in cultivated fields are, in the main, quite different from the species which are so destructive to range lands of the Plains area. Only comparatively little study is being made of these species, except as they migrate into cultivated areas. Special attention is being given to determining more effective and economical baits, especially the development of those which may be substituted for the standard bran mash now recommended. Emphasis is also placed on ecological factors influencing the abundance of the grasshoppers and the habits of the various economic species. These activities are carried on at Bozeman, Mont., Forest Grove, Oreg., Tempe, Ariz., and Sacramento, Calif.

One of the most effective ways to prevent the building up of large outbreaks of grasshoppers such as occurred during the last few years is to locate centers of incipient infestations and apply control before the infestation builds up to outbreak proportions. To secure information of this nature surveys are carried on in cooperation with various State agencies. In this work the States contribute approximately half of the cost. The information secured from the cooperative survey of the past season was, of course, available to the responsible State agencies and was the basis for the organization of cooperative control work this season. Without it, it would have been impossible to intelligently direct informational work about the outbreaks or distribute bait materials made available from various sources. The continuation of this survey work will develop facts which should serve as an insurance against further outbreaks and avoid the necessity of large appropriations for control. What is equally important, however, is that this survey work will also assemble data on occurrence and distribution in relation to environmental factors, information essential in the development of control measures, and a definite policy on ways of combating these important pests.

The Mormon cricket and its near relative, the Coulee cricket, have recently occurred in unusual abundance in certain sections in the Intermountain States. After destroying range grasses they migrated from these range lands to farms in the mountain valleys. In combating these outbreaks the need for more effective and readily applicable methods for control was emphasized, as well as information as to the causes of outbreaks and the possibility of carrying on measures to prevent their occurrence. The work now under way includes studies to improve direct methods of control and surveys to determine the status and distribution of the insects. The surveys are conducted in cooperation with State agencies and the investigations are headquartered at Bozeman, Montana.

White grubs, the immature stage of June beetles, are important pests of sod lands and cereal crops. Serious damage has occurred over considerable areas in the North Central States region in the past few years, and there have been heavy losses in many isolated sections throughout the United States. The damage is done by the grub and also by the adult beetle. There are many native species of white grubs. The life history of various forms differs. Some species complete their life cycle in one year, while others may extend it for two, three, or four years. Methods now available for the control of white grubs are unsatisfactory. In an effort to develop more effective controls the work on these pests has been reorganized and coordinated under the direction of a new project leader. The principal activities are headquartered at La Fayette, Ind., and Madison, Wis.

Cutworms, the larvae of various species of moths, annually cause material losses to cereal and forage crops. At present studies on cutworms are being carried on in the laboratory at Manhattan, Kansas, to determine the possibility of avoiding infestations by the method of handling the land during the period when eggs are being laid. Observations are made at various other places throughout the country to determine the flight period of various moths of species known to be of economic importance.

Many of the common pests of cereal and forage crops are attacked by fungus diseases. Comparatively little is known regarding these diseases or conditions under which they may become abundant. Investigations are conducted in the laboratory at Forest Grove, Oregon, to determine the possibility of using diseases as an aid in control.

It is conservatively estimated that 5 percent of the cereals are destroyed or damaged by various insect pests during the process of milling and while the grain or products are held awaiting milling or shipping. These losses approximate $300,000,000 annually and are caused by only a comparatively few species which occur throughout the world. Investigations on insects attacking grain during storage and milling are headquartered at Manhattan, Kansas. The studies are carried on in the main milling centers in the vicinity of Kansas City, Mo., and Minneapolis, Minn., and are directed to securing accurate information regarding more effective control methods. One of the standard ways of control is to fumigate and special attention is given to determining the effect of various dosages of fumigants used, to devising more effective methods of applying fumigants, and to determining the practicability of using vacuum as an aid in eliminating infestation on mill products. These involve the determination of the temperature conditions under which fumigation can be effectively conducted in various types of mills and storages, as well as the effect of wind and other climatic factors on various fumigants and dosages. Some of the pests, such as the Mediterranean flour moth, are more easily killed than others and have led millers and others to develop erroneous ideas as to the effectiveness of standard treatments followed by losses due to the presence of other species which are difficult to control.

Many of the insect pests of cereal and forage crops were introduced into the United States during colonizations. Their natural enemies were in many cases left behind. Effort is being made to import these. At present special attention is being given to the importation of parasites of the Hessian fly and the European wheat sawfly. An effort is also being made to locate parasites of the hairy vetch bruchid and the alfalfa snout beetle, both of which are introduced pests which are attracting considerable attention. The latter is known to occur only in the general vicinity of Oswego, New York.

2. European Corn Borer Investigations.--Work under this project is concerned with the entomological phases of investigations on the European corn borer. Its objectives are the origination and perfection of effective and economical methods to control the pest and surveys to secure facts as to its status. The survey of 1934 showed that, although climatic factors over much of the infested area had been unfavorable for the development of the borer and it had not spread to any extent to the West, it had materially increased along the Atlantic Coast from Connecticut south to the eastern shore of Virginia.

There was severe injury to sweet corn in the New England area, especially in Connecticut and Rhode Island. Losses to field corn have been localized and confined largely to parts of Ohio and New York. Special attention is now being given to determine methods of controlling the insect in sweet corn by the use of insecticides, and good progress has been made in developing formulae which may be made available to growers. Work on varieties of corn resistant or tolerant to the borer is conducted largely at Toledo, Ohio, and one character of resistance in field corn has been definitely determined. This is being developed in strains, about 140 of which are being studied to select for fixation in varieties suitable for commercial use. Mechanical measures and cultural practices for control are being studied in order to perfect simpler methods and devices which may be used throughout the infested area. The colonization and introduction of parasites are directed largely to the establishment of these natural aids in areas where they do not now occur, especially in western Massachusetts, Connecticut, Long Island, New Jersey, and the newly infested sections of Maryland and Virginia. Surveys to determine the general distribution, abundance, and status of the corn borer are continuing and form an important part of the work having a bearing on research and control activities. A special survey conducted in 1935 under an allotment from emergency relief funds showed that the borer had increased in many parts of the infested area and that it had become established in new sections adjacent to the known infested area.

The survey made in the fall of 1936 to determine the relative abundance of the European corn borer involved examination of 2,148 corn fields in 156 counties in the known infested area. In certain sections of the Lake States, notwithstanding the unfavorable weather, there has been a definite increase in the number of borers. In some areas the number of borers per hundred plants was between 101 and 500. In the more southern part of the infested area in Ohio and Indiana, however, there was a definite decrease in infestation in 1936 as compared with 1935. In part of Canada near the Lake States there has been an increase in abundance and appreciable commercial damage reported. Over a considerable part of the infested area in the New England States there has also been an appreciable increase in abundance. In the eastern part of the New England States and New Jersey the degree of infestation is comparable with that of 1935, while there was some decrease in the infestation in Virginia.

3. Sugarcane and Rice Insect Investigations.--This work is headquartered at Houma, Jeanerette, and Crowley, La., Beaumont, Tex., and Everglades, Fla. Special attention is now being given to the following activities:

The sugarcane moth borer annually causes very excessive losses to cane in the United States, reducing the yield by boring in harvested cane and injuring the stand by attacking seed cane. Studies are now under way to determine the susceptibility of different varieties of cane to moth infestation and to determine the characters responsible for resistance and attractiveness. Indications are that certain varieties with a hard rind are less attractive and less susceptible to attack. Information regarding these varietal differences may offer a measure of protection from the cane borer. Studies on this insect also include the possibility of utilizing parasites as a means of control. Investigators in other countries report

that one of the cosmopolitan egg parasites is effective in the control of the cane borer. Experiments conducted by the Bureau during the past few years demonstrate that the artificial colonization of this parasite has little, if any, additional effect on control. The investigations on this egg parasite have been concluded. The cane borer occurs in many cane-producing sections. A number of years ago special funds were provided to introduce certain parasites which attack it in South America. Attention is now directed to determining the status of these parasites and to introducing and colonizing in Florida others which have been especially effective in certain islands of the West Indian group.

Certain insects transmit various diseases of cane, particularly the mosaic disease, which is an important limiting factor in the production of cane in Louisiana. The recent discovery of two other species of aphids which carry certain of the mosaic diseases may offer an explanation of the variation in the severity of these diseases on different plantations and locations. The determination of further information about these vectors and their relation to native grass hosts, particularly those attacked by mosaic diseases, and the effect of attending ants on the abundance of aphids need further study. Studies on the insect vectors of these diseases are being carried on in cooperation with the Bureau of Plant Industry.

Among the other insects attacking sugar cane are the sugarcane beetle, which also attacks rice and often causes material losses to both crops; the sugarcane mealybug, wireworms, and the lesser cornstalk borer. Investigations to determine methods of controlling these pests by artificial and cultural means are under way.

A condition known as "pecky" rice causes excessive annual losses, which during the year 1931 were estimated at $700,000 and in 1932 at $350,000. This condition is the result of feeding of various species of insects on the rice in the field, the results of which are evident on harvested and stored grain. Investigations to determine methods of controlling the insects responsible for this damage are under way. Studies are also being made of the rice-stalk borer and of insects which attack the crop in the field and remain with the harvested rice to do further damage in mills and warehouses.

Until recently practically no work had been done on the control of various pests of rice in storage. Experiments have been begun in a limited way to determine the effect of various fumigants and the dosage required to control some of the commoner pests in rice mills and in warehouses where rough and cleaned rice are stored.

(n) EUROPEAN CORN BORER CONTROL

Appropriation Act 1937..... $32,939
Budget Estimate, 1938..... 32,939

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Inspection and certification of products regulated by quarantines on the European corn borer.....	$32,850	$32,939	$32,939
Unobligated balance.....	89	- - -	- - -
Total appropriation.....	32,939	32,939	32,939

WORK UNDER THIS APPROPRIATION

This item provides for the certification of products originating in the infested areas to meet the requirements of State quarantines on account of the European corn borer. To secure protection from the artificial spread of the corn borer, following the removal of the Federal quarantine, many States issued quarantines prohibiting or regulating the entry of products that may carry the borer from the infested area. Certain products may be safely moved after adequate inspection. To provide for this inspection and certification, the Bureau is cooperating with various States and certifying such products going to States which maintain corn-borer quarantines but do not recognize State certification. There is no reason to anticipate that any developments now in sight will lead to fewer demands for certification.

EMERGENCY FUNDS

Direct Allotment

Projects	Obligated, 1936
Emergency Relief Appropriation Act of 1935:	
European corn-borer survey.....	$83,863

(o) BARBERRY ERADICATION

Appropriation Act 1937..... $200,000
Budget Estimate, 1938..... 200,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Eradication of the barberry in the 13 States where work was begun in 1918.....	$176,280	$178,280	$178,280
2. Eradication of the barberry in other States.....	16,770	17,070	17,070
3. Inspection of nurseries which ship barberries interstate.....	4,583	4,650	4,650
Unobligated balance.....	2,367	- - -	- - -
Total appropriation.....	200,000	200,000	200,000

CHANGES IN LANGUAGE

This paragraph has been amended by eliminating the phrase "That $30,000 of this amount shall be available for expenditure only when an equal amount" and substituting in lieu thereof the following: "That, in the discretion of the Secretary of Agriculture, no expenditures from this appropriation shall be made for these purposes until a sum or sums at least equal to such expenditures". As amended, the proviso will then read:

> "Provided, That, in the discretion of the Secretary of Agriculture, no expenditures from this appropriation shall be made for these purposes until a sum or sums at least equal to such expenditures shall have been appropriated, subscribed, or contributed by States, counties, or local authorities, or by individuals or organizations for the accomplishment of such purposes".

This is the same provision as that carried under "Dutch Elm Disease Eradication" and other items dealing with the control of major plant diseases, the amendment being made in the interest of uniformity. It has been the experience of the Department that the States contribute materially to the work carried on under this item. It is believed such cooperation will continue under the amended language and will eliminate the necessity for keeping separate bookkeeping records under the limitation specified in the old language, as required by the recent decisions of the Comptroller General.

WORK UNDER THIS APPROPRIATION

Funds available under this appropriation provide for cooperation with States, individuals, and other agencies in the eradication of the common barberry, the intermediate host of black-stem rust fungus. The purpose of this work is to control black-stem rust of wheat, oats, barley, and rye, and to prevent the occurrence of epidemics of this disease. This work consists of locating and removing bushes of those species or varieties of barberry which serve as intermediate hosts of the fungus. Federal funds are used largely for the supervision and coordination of the work of State and local agencies which supply labor and inspectors and share in the expenses of scouting. Barberries may resprout from portions of roots left in the ground or be produced from seeds which have lain dormant on the ground for some time. It is therefore essential that the areas be reinspected to insure that the plants have been eliminated.

The work of eradicating rust-susceptible barberries was begun in 1918 in the following thirteen States: Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming. During the past two seasons similar work has been undertaken in Missouri, Pennsylvania, Virginia, and West Virginia, financed largely from allotments of emergency funds. The work in these areas gives needed protection to local wheat-producing sections which in certain localities is of prime importance from a food standpoint and is largely in the nature of campaigns for local control. That done in certain sections also gives protection to the main wheat crop. This is especially the case in Missouri, where the work is centered in counties adjoining the Illinois and Iowa State lines.

A Federal quarantine prohibiting and regulating the movement of barberry plants is enforced, and a small part of this appropriation is used for the inspection of nurseries which ship barberry plants interstate. Certain varieties of barberry are immune to the disease and under appropriate inspection and certification can move without risk. The movement of rust-susceptible varieties is prohibited.

During the past three years the work of destroying barberry plants has been materially increased by special allotments of emergency funds available for relief. This work has put the program ahead a number of years, with corresponding benefits. All these activities have been and are being directed with the trained regularly-employed Bureau personnel, without which they could not be undertaken. The bulk of the regular appropriation is expended for this supervision, although a small portion of it will be used for the necessary checking of work being done, the coordination of work with local agencies, and the directing of appropriate educational campaigns.

The benefit from the eradication of barberry in wheat areas is well recognized, and farmers, farm organizations, milling and railroad interests, and farm-machinery groups support and endorse the work. State, local, and other agencies also cooperate and support it. There has been a steady reduction in the general damage from stem rust since the beginning of the campaign.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Public Works Allotments (National Industrial Recovery Act): Barberry eradication.....	$12,911	- - -
Emergency Relief Appropriation Act 1935: Barberry eradication.....	1,489,741	$360,759
Emergency Relief Appropriation Act, 1936: Barberry eradication.....	- - -	925,000
Total, Emergency Funds (Direct Allotments)...	1,502,652	1,285,759

(p) COTTON INSECTS

Appropriation Act, 1937.....	$147,244
Allotment to "Foreign Parasites" (collection and introduction into this country of natural enemies of pink bollworm).....	-2,700
Total available, 1937.....	144,544
Budget Estimate, 1938.....	144,544

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
1. Cotton boll weevil investigations...	$54,344	$54,404	$54,404
2. Investigations on miscellaneous cotton insects.....	52,096	52,125	52,125
3. Thurberia weevil investigations....	9,965	9,965	9,965
4. Pink bollworm investigations.....	28,050	28,050	28,050
Unobligated balance.....	89	- - -	- - -
Total appropriation.....	144,544(a)	144,544	144,544

(a) For 1936, excludes $2,700 allotted to "Foreign Parasites", which is being set up as a separate item in the Estimates for 1938.

WORK UNDER THIS APPROPRIATION

General.--The funds provided hereunder are used for investigations on insects attacking cotton plants and crude cotton products and for the development or improvement of direct or indirect methods of control. Comparatively few States are engaged in the investigation of insects attacking cotton. Practically all the investigations conducted in the United States for the control of insect pests of this important crop are, therefore, provided for under this item. The investigations are divided into four main projects, as follows:

1. Cotton Boll Weevil Investigations.--This project provides for studies on the boll weevil, the most important cotton pest in the South, and the development and improvement of control measures. The scope of studies under way covers a wide field, some of the more important lines of work being the following:

Cage tests are made to determine the toxicity of new insecticides or new combinations of those tested in comparison with the standard, calcium arsenate, and the effect these materials or combinations may have on the cotton plant. These cage tests are used as the basis for field tests.

New and promising insecticides or combinations of insecticides are tested in the field in comparison with the measures now recommended. The standard insecticide, calcium arsenate, is not satisfactory under all conditions, and field tests are made to determine the possibility of modifying applications or adding other insecticides to each application to improve its effectiveness. These tests also have for their object a determination of the practicability of using lime or other materials as diluents or carriers of calcium arsenate. The details for the control of the boll weevil differ in various parts of the cotton belt, and accurate information is not available for certain sections as to the most effective time to apply the standard calcium arsenate method to secure effective control. To secure data applicable to the southern part of the eastern Coastal Plain the field tests were extended during the present season by the establishment of cooperative work in Georgia. The field studies also include tests to determine whether it is more practicable to reduce the amount of calcium arsenate in the earlier applications or to eliminate the calcium arsenate applications and use molasses-calcium-arsenate mixtures or substitute sulphur or other non-arsenicals. The work is conducted from laboratories in South Carolina, Georgia, Mississippi, and Louisiana.

In certain areas, particularly those along the Atlantic Coastal Plain, calcium arsenate and other arsenicals appear to have a deleterious effect on certain types of soil. Studies are under way to determine the effect insecticides used for control of the boll weevil have on cotton, forage, or truck crops that may later be planted in these soils.

Certain native parasites are known to attack the boll weevil, and studies are under way in cooperation with various States to determine the seasonal and geographical distribution and abundance of these parasites and to ascertain the relation they may have to other insects and environmental factors. These studies are for the purpose of determining whether

it would be practicable to utilize these natural agencies in control. During the seasons of 1934 and 1935 a general survey was carried on in cooperation with various State agencies. In certain sections natural enemies contribute to reducing the weevil to such an extent that artificial control is seldom required. The reason for the effectiveness of various natural enemies in certain sections and not in others is not understood, and detailed studies are under way with the hope of determining the factors which affect the abundance of natural enemies.

Studies are under way to determine the characters of the cotton plant which make certain varieties resistant to the boll weevil. The early development of tough carpel lining and the pilosity of the bolls seem to be characters which affect their suitability for oviposition by the weevil. Some seventeen varieties have been under observation, five of which were studied closely. The observations on these varieties require considerable labor. This work is carried on in cooperation with the Bureau of Plant Industry at five experiment stations in Mississippi and two in Louisiana, with main headquarters at Stoneville, Mississippi.

The boll weevil is apparently largely restricted to cotton, but it will attack certain other malvaceous plants. Studies are in progress to determine how important these varieties may be as hosts.

2. Investigations of Miscellaneous Cotton Insects.--Work under this project includes studies on the distribution, life history, and habits of many insect pests which occur rather widely through the cotton belt and the development of control measures for those which are particularly injurious. In some sections various native insects are more important as pests of cotton than is the boll weevil, and in all parts of the main cotton belt their control has to be considered and timed in connection with that applied for other pests. Some of the problems now receiving special attention are:

The cotton flea hopper and closely allied insects which cause the cotton plant to shed squares are very important pests and often cause extensive damage over wide areas. In the Coastal Plain section of Texas the cotton flea hopper is the most important cotton pest. Investigations to determine methods of control by the use of insecticides and by cultural practices are being made. These studies are centered at Port Lavaca, Texas.

The cotton bollworm causes considerable damage to cotton and in many parts of the western section of the main cotton belt is considered the most destructive cotton insect pest. Studies to determine the relation of this pest to environmental factors, the effectiveness of insecticides or repellents to the moth, and the possible value of natural enemies are in progress. Its control by insecticides is difficult because they must be applied before the worms enter the bolls. Much of this work is carried on from the laboratory at College Station, Texas, and is done in cooperation with the Texas Agricultural Experiment Station.

Root aphids are pests of considerable importance in the eastern part of the cotton belt, particularly along the Atlantic Coastal Plain. Studies for control by cultural practices and insecticides are being carried on at

Florence in cooperation with the South Carolina Experiment Station. There are at least three species involved and the host habits, particularly the relation to certain weeds and grasses, have an important bearing on control.

Preliminary investigations indicate that Fusarium wilt of cotton may be disseminated by insects which occur commonly in cotton fields. Studies to determine the part such insects may play in spreading these diseases are being carried on in cooperation with the Texas Agricultural Experiment Station.

At least six different species of true bugs injure cotton, especially in regions where this crop is produced under irrigation. These pests cause shedding of the squares and young bolls and stain the lint, thus materially lowering its quality. Studies are being made to determine the relation of these bugs to their native host plants and the practicability of controlling the insects by the use of insecticides or cultural means. Much of this work is being carried on in Arizona, with field headquarters at Tucson.

Comparatively little is known about the various soil-inhabiting insects which injure cotton. There are many different kinds, some of which cause considerable injury in certain localities. A study is under way to determine the species involved in various types of soils and to determine methods for control in sections where this is required.

Some of the native insect pests of cotton, such as the red spider, cotton stainer, leaf perforator, crickets, and flea beetles occur in outbreak numbers periodically and cause important losses over considerable areas. Effective means for controlling many of these are not known. Studies to determine the life history and habits of these pests and how they can be controlled are in progress at the various field laboratories, particularly those at Tallulah, La., and Florence, S. C.

3. Thurberia Weevil Investigations.--This project provides for investigations of the life history, habits, and development of control measures for the Thurberia weevil, the western form of the cotton boll weevil, which is confined to the limited portions of the cotton-growing area of southeastern Arizona and parts of Mexico. This insect is a dry-land form of the cotton boll weevil and has as its native host wild Thurberia cotton, which is generally distributed throughout the mountainous regions of the Southwest. This weevil has adapted itself to cotton and is a potential enemy to cotton production in the arid regions. Its habits differ from those of the boll weevil, and in limited areas around Tucson it has demonstrated that it can do material damage to cultivated cotton. Present studies are concerned with its distribution and its adaptation to cultivated cotton and to the development of control measures by the use of insecticides.

Under allotments from emergency funds, relief labor is being used to locate and destroy Thurberia plants in areas where the weevil occurs. It is important that surveys be made to determine the effect this work has on infestation of the weevil on both Thurberia and cotton.

4. Pink Bollworm Investigations.--These activities are concerned with investigations on the pink bollworm to develop needed facts regarding its life history and habits and to improve and develop new control measures which may be used in combating the insect in the limited sections of the United States where it has become established. This work will also serve as an insurance by providing additional information regarding means of controlling or eradicating the pest should it become established in new areas. The work is carried on in cooperation with the Texas Agricultural Experiment Station and the Mexican Department of Agriculture. Headquarters are maintained at Presidio, Texas, and Tlahualilo, Durango, Mexico. Special attention is now being directed toward:

Breeding and colonization and introduced parasites. Four parasites have been introduced from Egypt and two from Hawaii. These are being bred in the laboratory at Presidio and colonized in the heavily infested sections along the Mexican border in both the United States and Mexico. The more promising of these parasites have only recently been received and the work with them is just getting started. Incidental studies on native parasites are also carried on as part of this activity.

The use of insecticides. This work is being studied in the laboratory and in the field to determine the toxicity of various materials and the possibility of applying them under field conditions to reduce or control this pest.

Studies on control by cultural means, which are under way in cooperation with the Bureau of Agricultural Engineering. This work includes experiments to determine the effect of plowing and irrigation on the overwintering larvae and to develop machinery which can be used in cleaning the field of crop remnants.

Observations on the life history and habits, which are being made to determine needed additional facts, including the effect of various conditions on survival and hibernation. During the past season emergency funds were allotted to construct a large field cage, in which it is possible to control the infestation, and more emphasis is being placed on the work on cultural control and seasonal history.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act, 1935:		
Construction of portable insectaries at Tallulah, La.	$1,813	- - -
Construction of field insectaries at Presidio, Texas	3,944	$703
Construction of field insectaries at College Station, Texas	1,948	- - -
Total, Emergency Funds (Direct Allotments)	7,705	703

(q) PINK BOLLWORM CONTROL

Appropriation Act 1937.....	$276,839
Budget Estimate 1938.....	296,800
Increase.....	19,961

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Pink bollworm control operations				
Supervision of sterilization of cotton or cotton products required by Federal quarantine.....	$105,537	$107,539	$107,539	- - -
Scouting within regulated area to determine status of pink bollworm.	34,000	34,000	34,000	- - -
Scouting outside regulated area to determine possible presence of pink bollworm.....	68,400	68,400	88,361	+$19,961(1)
Cleanup operation to aid in control of pink bollworm in Big Bend of Texas.....	15,000	15,000	15,000	- - -
Vehicular inspection to determine compliance with quarantine on pink bollworm.....	5,000	5,000	5,000	- - -
Eradication of wild cotton in Florida for protection against infestation of pink bollworm.....	46,200	46,900	46,900	- - -
Unobligated balance.....	2,702	- - -	- - -	- - -
Total appropriation.....	276,839	276,839	296,800	+19,961(1)

INCREASE

(1) The increase of $19,961 for 1938 is needed for extending scouting operations to determine the presence of the pink bollworm outside the regulated area. With the funds now available for this purpose it is possible to examine only a small part of the main cotton belt. Many sections have not been scouted since 1932. These areas should be carefully gone over to detect the possible presence of the pink bollworm. The recent discovery of this insect in the lower Rio Grande Valley opposite Matamoros emphasizes the importance of scouting in areas outside the present quarantined area. If infestations are not discovered in their incipiency, the work of eradication will be greatly increased, involve larger expenditures, and interfere with the production and marketing of the cotton crop over large areas. The increase requested is the minimum required to permit scouting in sections which should be examined to give needed protection.

WORK UNDER THIS APPROPRIATION

This work includes activities concerned with the prevention of spread of the pink bollworm from the infested area, including the enforcement of the quarantine; control operations in the area along the Mexican border contiguous with the infested area in Mexico; eradication activities in isolated points of infestation; scouting to determine the presence of the worm in uninfested sections; the eradication of wild cotton in Florida; and other related work to protect the cotton culture of the United States from this pest.

The pink bollworm is one of the most destructive pests of cotton and is generally established in all important cotton countries except the United States. It occurs only in limited areas in this country but is a potential menace to cotton culture over most of the United States. It is believed that extermination of the insect throughout the infested area is possible except for those sections adjacent to sources of infestation in Mexico. Infestations have been eradicated from large areas in Texas, Louisiana, and Arizona. The area in the United States now known to be infested by the pink bollworm includes parts of Arizona, New Mexico, and Texas adjacent to the Mexican border where cotton is grown under irrigation and a few sections of the southern part of Florida. The recently discovered infestation in the general vicinity of Brownsville, Texas, is at the western end of the area of continuous cotton culture.

The quarantine requirements in various parts of the regulated area differ in some details, depending on conditions of infestation. In all areas the seed is sterilized and its handling at oil mills, etc., regulated. In some sections where the infestation is heavy the lint has to be fumigated and compressed before it can be shipped. All the gins, oil mills, compress, and fumigating plants in the infested area have to be supervised to see that they comply with necessary safeguards. All cotton products which may leave the quarantine areas have to be certified. These operations are closely associated with the marketing of the crop, the work must be handled in an effective manner to give required protection, and adequate provision must be made for the orderly handling of the crop.

There is need for careful and thorough inspection within the regulated areas to determine conditions of infestation. The regulations enforced differ as between lightly and heavily infested areas, and the determination as to this degree of infestation can best be made by gin-trash machines. The use of these machines can not be replaced by any other form of inspection with equal efficiency and economy. The cost to producers of compliance with the regulations in the sterilization of seed and lint is directly affected by the information obtained from the use of these machines within the regulated area.

The operation of the quarantine depends, of course, upon an accurate knowledge of the distribution of the pest. The fact that the pink bollworm does or does not exist in this country outside the regulated area must be determined for obvious reasons. The cheapest and most efficient way to do this would be through the use of gin-trash machines throughout the cotton-growing areas. Since this can not be accomplished under the appropriation, the alternative is to provide a substitute for gin-trash inspection through the collection of bolls from all areas of the main cotton belt. These are kept in preservatives and inspected in laboratories during the off-season when field work permits.

The development of machines capable of segregating gin trash, leaving the larvae of the pink bollworm readily exposed to view in an almost negligible quantity of trash, has brought this type of inspection to a point which justifies its consideration as an item altogether separate from that of scouting, although it is an essential part of the scouting work. These machines have been improved from year to year and are now mounted on trucks, which enables them to be moved readily from one location to another. Since it is not necessary to tear down and set up the equipment, machines may be moved from gin to gin or locality to locality under their own power as circumstances may require and the efficiency of the work is greatly increased. The use of these machines at gins in and out of the regulated area furnishes a more comprehensive knowledge of pink-bollworm conditions throughout the entire cotton belt. The gin-trash machine furnishes the most positive evidence with respect to the presence or absence of the pink bollworm in a given locality. It is this inspection on which greatest reliance is placed for the finding of infestations of pink bollworm before they have time to become thoroughly established and spread over considerable areas. These surveys are in the nature of insurance and, in order to give the protection necessary, should be expanded.

The laboratory inspection and gin-trash inspection are supplemented by a third method of determining the presence or absence of the pink bollworm. This third method consists of field inspection. It is used in areas outside the regulated area where some reason exists for suspecting the possibility of infestation, where it is important to discover this infestation at the earliest possible moment, and where the infestation must be traced to definite fields of growing cotton.

The heavily-infested section is in the vicinity of Presidio, Texas. Cotton heavily infested with the pink bollworm in Mexico is separated only by a little more than the width of the Rio Grande from growing cotton in the United States, infestation being heavy on both sides. A general program of suppression and control is maintained in this area on the American side of the border. This includes field cleanup and other operations to reduce the infestation and the hazard of spread because of the occurrence of large numbers of moths and worms. On the Mexican side of the line agricultural officials and growers are watching the progress of the work across the river, and good cooperation is being received, there being a rather general and concerted attempt to follow the cleanup procedure.

The danger of spread by the movement of seed and lint by truck or similar means from the heavily-infested section in the Big Bend Section of Texas is markedly greater than from the lightly-infested sections. To prevent such movement, road stations are operated in cooperation with the State on the important roads leaving the heavily-infested section.

In southern Florida, where a very heavy infestation has been found in wild cotton, the program has consisted of removal of this wild cotton. At the outset that most accessible to the average resident or tourist was removed first, gradually working back to more remote locations. It is believed that most of the wild cotton has been located. Experience, however, has shown that some of this cotton will sprout from portions of the roots which were not removed, and it also comes from seed remaining in the

soil. This necessitates going over the ground again and probably several times. Work on the removal and destruction of wild cotton can be done only during the drier seasons.

EMERGENCY FUNDS

Direct Allotment

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act of 1935:		
Wild cotton eradication.....	$59,806	$7,194

(r) THURBERIA WEEVIL CONTROL

Appropriation Act 1937..... $2,808
Budget Estimate 1938..... 2,808

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Enforcement of Thurberia weevil quarantine.....	$2,798	$2,808	$2,808
Unobligated balance.....	10	- - -	- - -
Total appropriation.....	2,808	2,808	2,808

WORK UNDER THIS APPROPRIATION

This item provides for the administration and enforcement of the Thurberia weevil quarantine, which regulates the movement of cotton and cotton products from the two counties in Arizona where this pest is known to occur. The work involves supervising the handling, treatment, and movement of cotton, cottonseed, and other articles likely to carry the Thurberia weevil into uninfested regions. The Thurberia weevil is a native variety of the Mexican boll weevil and occurs in limited areas in Arizona and parts of Mexico. Under natural conditions this native insect lives on wild Thurberia cotton. With the production of cultivated cotton in the area it has become attracted to this crop. The weevil has demonstrated capacity to breed in cultivated cotton and, because of its ability to live under arid conditions, is a menace to cotton grown under semi-arid conditions. The expenditures

for the enforcement of the quarantine are of a continuing nature and are the minimum required to meet conditions.

The removal of Thurberia plants from the uncultivated areas in the region where infestation occurs, which was begun in 1935 with emergency funds, has continued. This destruction of the wild host of the weevil, which is a plant of no economic importance, may reduce the possibilities of infestation in commercial cotton, thus lessening the opportunity for spread. The actual effect that this work may have on the abundance of the weevil is not yet known, and it is not possible to make any immediate modifications in the quarantine requirements to safeguard the spread of the weevil.

EMERGENCY FUNDS

Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act of 1935:		
Locating and destroying Thurberia plants.....	$125,172	$42,302
Emergency Relief Appropriation Act of 1936:		
Locating and destroying Thurberia plants.....	- - -	52,000
Total, Emergency Funds (Direct Allotments).	125,172	94,302

(s) BEE CULTURE

Appropriation Act, 1937.....	$75,500
Budget Estimate 1938.....	83,000
Increase.....	7,500

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Bee culture and apiary management.....	$67,507	$75,500	$83,000	+$7,500 (1)
Unobligated balance.....	493	- - -	- - -	- - -
Total appropriation....	68,000	75,500	83,000	+ 7,500 (1)

INCREASE

(1) An increase of $7,500 for investigations to develop more effective means of combating the bee disease known as American foulbrood. American foulbrood is the most destructive disease of bees in the United States. Under normal conditions it takes an annual toll of approximately five percent of all the colonies. Its presence requires intensive inspection work and consistent effort on the part of beekeepers. Annual expenditures approximate $3,000,000 for State regulations designed to combat the disease, and the only effective means of combating it is to burn the colonies where infection is found. In addition to the destruction of the colonies, this involves the loss of the beekeeping equipment. The disease may lie dormant for a number of years, and lightly infected colonies are easily overlooked, so that inspection and present control measures are at best only partially effective.

It appears that certain strains of bees are resistant or tolerant to this disease and that it may be possible to develop fixed varieties which have these characteristics. One of the other important bee diseases is very largely controlled by the use of resistant varieties. An increase of $7,500 provided for the current year under this item has permitted the initiation of investigations to develop strains of bees that are resistant to this disease. The preliminary results tend to confirm the previous ideas that it is practicable to develop strains of bees resistant or tolerant to this disease. Certain strains which appear to have resistant characteristics have been located. The production of stock which can be tested under conditions in various parts of the country is an essential part of these investigations, and the increase here requested would be used largely for this purpose. The checking on the strains would be done largely by State agencies which are cooperating in this work. The amount now available is not sufficient to breed the queens for distribution, and, in order that these studies may be made in the most effective and economical manner, it is important that queens from supposedly resistant stock be tested widely as rapidly as possible. Investigations of this nature will have to be conducted over a considerable period of time, and after resistant strains are located and proven to be resistant under various conditions, it will be necessary that these characters be combined with others desired and most suitable to the various regions. Because of the time required to perfect the useful and resistant strains, it is especially important that the work of breeding and developing the strains be carried on more rapidly than possible with the present funds.

WORK UNDER THIS APPROPRIATION

The work carried on under this item is concerned with investigations on the habits and management of bees to make the production of honey and wax more profitable and to facilitate the pollination of fruits and vegetables and forage crops by the use of honeybees. This is the only item in the appropriation made by the Federal Government which provides assistance or aid to the beekeeping interests in the United States, the annual value of which may be conservatively estimated at $100,000,000. Only fourteen States carry on investigations in the field of bee culture. They look to the United States

Department of Agriculture to supply them the necessary information regarding the management of bees, control of their diseases, and satisfactory and effective handling of them in the pollination of plants and production of honey and wax. The headquarters are at Beltsville, Md., where the work is administered and investigations are conducted. This laboratory also studies problems affecting the Eastern States. Field laboratories are located at Laramie, Wyo., Baton Rouge, La., and Davis, Calif., to investigate problems peculiar to these regions and also to study the effect of regional conditions on problems occurring throughout the United States.

Diseased bees or samples of broods from diseased colonies are sent from all parts of the United States to the Beltsville, Md., laboratory for diagnosis. This work is of a service nature and is essential to the beekeeping interests of the country. This laboratory also issues permits authorizing the importation of live bees into the United States and examines all shipments to see that they are free from disease and meet the requirements of the law governing the importation of living bees and the regulations promulgated thereunder. The diseases of bees are studied at various laboratories, especially those at Beltsville and Laramie. These investigations include studies on the life history of the diseases, especially European foulbrood and para-foulbrood, recently discovered in several Southeastern States, and the means by which they may be combated. Emphasis is now placed on the way diseases may spread through beeswax and honey and the relation of the location of infection to sources of infectious honey. Special attention is directed to the possibility of combating American foulbrood through the development of resistant strains of bees. These special studies were begun during the current year and are being carried on cooperatively with State experiment stations of Iowa, Wisconsin, Wyoming, and Texas.

Studies are under way at the laboratories at Baton Rouge, La., and Beltsville, Md., to develop improved strains of bees, attention being directed primarily to producing bees which have greater longevity and greater honey-carrying capacity; bees with longer tongues so they will be more effective in the fertilization of plants, such as clover; and bees which will be more hardy in northern climates and strains which will be active under adverse weather conditions.

In cooperation with the Bureau of Agricultural Economics and the economic divisions of experiment stations and State colleges, investigations are under way to secure the necessary information regarding the economic aspects of the beekeeping industry in the Pacific Coast States. The work in California is carried on in cooperation with the economists of the Giannini Foundation, and that in Oregon is carried on in cooperation with the State agricultural experiment station. The special field work on these surveys is nearly complete and the results are being prepared for distribution.

Studies are under way to determine the regions producing the most satisfactory honey flora and the time when honey plants are available from the standpoint of honey production. Studies to determine the types of honey produced by various plants are also under way. A limited amount of work is being done to determine the value of honeybees in pollinating certain deciduous

fruits. The effect of certain poisonous plants and their relation to bee-keeping are also being studied.

The shipment of bees in two- and three-pound packages with queens is a relatively new and rapidly growing industry. Such shipments permit the prompt establishment in Northern States of vigorous colonies at a time when they are most needed for the pollination of various fruit trees. It also permits the strengthening of colonies which have become weakened due to adverse weather conditions occurring through many areas during the winter. Considerable loss has occurred in the shipment of bees and there has been constant litigation between the shippers and the express agencies. Investigations are now under way to determine the best methods of handling colonies to develop satisfactory shipping containers and food that may be used in transit, as well as methods of caring for the packages at destination or at transfer points.

Limited attention is given to a number of other problems to determine at least preliminary data needed in relation to the work on other activities. One of these has to do with the flight habits of bees, another with colony population, and still another with the effect of a reserve supply of pollen. Studies on beeswax are also carried on in cooperation with the State agency in California.

(t) INSECTS AFFECTING MAN AND ANIMALS

Appropriation Act 1937	$150,148
Budget Estimate 1938	172,600
Increase	22,452

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. Investigations on insects affecting man	$43,723	$44,123	$44,123	- - -
2. Investigations on household insects	14,414	14,475	14,475	- - -
3. Investigations on insects affecting animals	57,950	88,350	110,802	+$22,452 (1)
4. Investigations on insects affecting poultry and wildlife	3,000	3,200	3,200	- - -
Unobligated balance	1,061	- - -	- - -	- - -
Total appropriation	120,148	150,148	172,600	+ 22,452 (1)

INCREASE

(1) An increase of $22,452 for studies in the development of new and more effective methods of controlling the screw worm. The cooperative educational and demonstrational campaign for screw-worm control has emphasized the need of further investigations to determine new and more effective methods of combating this pest. Present methods of control are concerned primarily with preventing infestation, the treatment of infested wounds, and preventing them from becoming reinfested before they heal. The materials recommended to kill maggots within the wounds and to repel the flies have been developed by studies carried on over a period of years and are far more effective than the medicines previously used. They are not, however, entirely satisfactory. Furthermore, it is difficult to give specifications which assure the procurement of standard material without the use of biological tests. The development of more effective medicines and the standardization of specifications are very important. The work now under way with funds allotted from the special appropriation for screw-worm control should be continued. The recommendations for preventing and treating infestations are satisfactory and effective when it is possible to handle the animals frequently, as may be done on the farm or where they are confined to enclosures. Under range conditions in the Southwest, however, these methods can not be used economically, and investigations to determine methods of combating the screw worm in the adult stage should be emphasized. Traps and baits are a possible line of attack and should be thoroughly studied. The screw worm does not overwinter over the entire area where it occurs in destructive numbers during the summer season. Studies of the climatological factors which influence its abundance and overwintering should develop facts which could be used as a basis of recommendations for control operations in the early spring which, if followed, would contribute to the prevention of the building up of outbreaks which spread northward and cause so much destruction over the large areas where the pest maintains itself throughout the year. The studies on these and other phases of the problem carried on with the funds now available for investigations on screw worm should be continued without interruption. In the areas where the screw worm has been long established stockmen and others believe the development of new methods of control is the most important type of work that can be undertaken to combat the losses caused by this pest, which average approximately $10,000,000 annually.

WORK UNDER THIS APPROPRIATION

General.--The activities under this item comprise investigations on insect pests attacking man or injuring him by carrying diseases, including those insect pests which annoy him in his habitation or destroy household supplies, fabrics, etc. This item also provides for investigations on insect pests of farm and range animals, poultry, birds, and wild birds and animals and the development of methods for their control or eradication. Activities are carried on independently or in cooperation with the Public Health Service and with the Bureau of Animal Industry and the Bureau of Biological Survey of the Department of Agriculture. The Bureau of Entomology and Plant Quarantine is, however, responsible for the investigations on insects.

1. Investigations on Insects Affecting Man.--The work under this project is concerned with investigations on insects which annoy man by direct attack or injure him by carrying diseases. Only a few of the more pressing problems are now being studied. The most important of them are explained below.

Mosquitoes as a class are the most important insect pests known to man. They are responsible for carrying such dreaded diseases as yellow fever, malarial fever, dengue fever, etc. There are many different kinds of mosquitoes and no one control measure is equally effective for all kinds. The habits of some of the commoner forms are fairly well known and means of control have been developed. The habits of many kinds are known only in a general way and effective controls are not available. Even with the commoner forms, methods of control depend on various local conditions. The planning for control campaigns requires technical assistance and at present the requests for advice can only be partially met. The studies under this project are conducted from Portland, Oreg., Savannah, Ga., Orlando, Fla., and Washington, D. C. Those in the Northwest are concerned largely with forms in flood water and those in Georgia and Florida with salt-marsh forms, although in Florida attention is also being given to the group of mosquitoes which obtains its air through plants rather than coming to the surface of the water. The work done from Washington has special relation to the transmission of equine encephalomyelitis by mosquitoes.

Sand flies are not known to carry diseases. They are, however, of prime importance to man in certain sections of the country, particularly along the southeast seaboard. The Bureau's investigations on sand flies are headquartered at Savannah, Ga., although some studies are also made in Florida. The habits of only a comparatively few species of these pests are known and for some of them no effective control measures are now available. It is, however, now possible to suggest control measures that will materially reduce the numbers of certain species. The value of these methods should be further tested and a way devised to combat those living in trees and to determine the effect of pumping out diked areas.

Eye gnats transmit a dangerous eye disease which is especially common among children of school age. These pests are particularly troublesome in parts of the Southern States and in certain regions in California. Recent investigations in California have developed means for partial effective control measures for that locality and work there has been suspended. Investigations now under way are conducted in the winter garden area of Texas, where a severe condition exists, and in localities in the Southern States.

The larvae of certain blowflies are used by surgeons to clean out and heal certain types of wounds, particularly bone lesions. In this work it is essential that they have available a constant supply of sterile maggots. The development of safe and economical methods of rearing and transplanting these maggots has been investigated and ways of safe handling developed. It has been found that excretions from the maggots may have a beneficial effect, and this subject is now being studied.

Certain ticks, including the common dog tick, transmit Rocky Mountain spotted fever. Studies are under way on the habits of these and other kinds

of ticks so as to determine facts which may aid in developing methods for their control. These include the investigation of repellents which may protect man from attack.

2. Investigations on Household Insects.--The activities falling under this project are concerned with insect pests in dwellings, hotels, etc., those annoying householders, and those destroying household supplies, drugs, fabrics, etc. There are many kinds of insects which annoy man or destroy his household possessions. The habits of these differ greatly; those of the same species may even differ under various conditions of artificial environment. The development of control measures is complicated because of the wide variety of conditions under which the pests occur. Special attention is now being given to the development of more effective methods of control by fumigation, the use of safe fumigants, and the determination of conditions under which various fumigant materials may be used. These studies also involve determining the effect that proposed controls may have on products in storage, households, stores, etc.

3. Investigations on Insects Affecting Animals.--The work under this project is concerned with the development of methods for the control of insects injurious to horses, cattle, sheep, goats, swine, and other domestic animals, as well as game animals.

Screw worms are pests of cattle, sheep, goats, and various other animals, causing immense losses, particularly under range conditions. The studies conducted with allotments from regular funds are carried on at field laboratories in Texas and Georgia. About 90 percent of the screw-worm infestations are caused by the species, recently defined, which restricts its breeding to live animals. The habits of this species are different from those of the composite species and should be studied in detail and more effective controls developed.

The larvae of certain flies, commonly known as cattle grubs, not only greatly injure hides but materially interfere with the effective management of dairy and range cattle. The annual losses from these insects are estimated at as high as $50,000,000. Studies of methods for controlling these pests are under way. The practicability of using materials containing rotenone is receiving special attention and holds considerable promise.

The larvae of certain flies commonly called horse bots cause material injury to horses and related animals and also greatly reduce their efficiency. These losses are much more serious than previously supposed. Recent investigations have developed new facts regarding the life history of these pests which will apparently have important relation to control operations. More complete information on the habits of these pests and on methods for preventing infestation are particularly needed.

The sheep head bot materially lowers the vitality of the infested animal and in many cases causes its death. Goat lice do a great amount of injury to the hair, particularly mohair, and also reduce the vitality of the animals. The losses caused by these pests to sheep and goat raisers are great, and there is an insistent demand for effective control measures. Experiments to determine the value of certain volatile materials and sulphur

are being carried out, but the effect of these possible treatments on the animals and insects needs further study.

A small allotment is used for work on the buffalo gnat. The work consists chiefly of securing data regarding outbreaks and incidental tests on repellents that may be useful.

In 1931 the factory value of fly spray was over $9,000,000, according to an estimate of the Bureau of the Census. The production of these sprays has increased greatly since that time. Many of those now used on farms to protect livestock, particularly dairy cattle, are valueless and even detrimental to cattle and to dairy and other food products. Investigations are now in progress to develop a more effective and cheaper spray. If successful, this work will be of material aid to the livestock and dairy industry and, besides controlling flies, will tend to reduce the opportunity for disease.

A number of species of ticks are detrimental to animals. Wounds caused by some ticks, such as the common ear tick, to cattle provide entrance places for other pests such as screw worms. Information on the distribution and habits of these species is not well known and no satisfactory control measures are available for several important species.

4. Investigations on Insects Affecting Poultry and Wildlife.--This project provides for investigations on insect pests and mites which attack poultry and wildlife. Studies which have been conducted have developed measures for the control of certain of the more important insect pests of poultry, and the limited funds are used also entirely to investigate various forms which attack wild animals, special attention being given to the effect the fire ant has on the nesting habits of game birds in the South. These investigations are carried on in cooperation with game-protection associations and are headquartered at Thomasville, Ga. Observations are also made on other insects attacking wild animals, especially those causing wounds which predispose attack by screw worms. The various insect pests of poultry levy a heavy toll on poultry owners in spite of methods of control already developed. The amount of these losses and their distribution over the entire country justify the effort to continue to develop control measures to supplement those now recommended, and a very small part of the allotment is used to purchase supplies for tests which may be made at various laboratories incidental to other work.

(u) INSECT PEST SURVEY AND IDENTIFICATION

Appropriation Act 1937.....	$134,798
Allotment to "Foreign Parasites" (for exchange of useful and beneficial insects)..	-5,000
Total available 1937.....	129,798
Budget Estimate 1938.....	159,790
Increase.....	29,992

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. Insect pest survey.....	$9,522	$9,559	$19,559	+ $10,000 (1)
2. Identification and classification of insects.....	120,019	120,239	140,231	+ 19,992 (2)
Unobligated balance.....	257	- - -	- - -	- - -
Total appropriation.....	129,798(a)	129,798(a)	159,790	+ 29,992

(a) For 1936, excludes $5,000 allotted to "Foreign Parasites", which is being set up as a new item in the Estimates for 1938.

INCREASE

The increase of $29,992 in this item for 1938 consists of:

(1) An increase of $10,000 to strengthen and make more effective the insect pest survey. Employees of the Bureau located in field laboratories throughout the country and cooperating State workers assemble and forward without cost records as to the occurrence and abundance of insect pests. These records, when coordinated and summarized, are essential aids in planning the type of information that should be furnished farmers and all agencies interested in combating various kinds of insect pests. The information is useful not only to the Bureau and other agencies of the Government, including those concerned with land planning and developing, but also to State entomologists. The plan of centralizing, coordinating, and evaluating records of the occurrence of insect pests has long been accepted and approved by the entomological forces of the country. Those contributing to the assembling of the information rightfully expect that data sent to Washington will be coordinated and the results made promptly available to aid them in planning their work. With the present force it is impossible to do this. There is an urgent need and persistent demand by all agencies concerned with the control of insect pests for information of this type. The willingness with which cooperating agencies respond in supplying the field data emphasizes the increasing interest in this work. The funds requested will merely restore the central coordinating unit to the efficiency prevailing prior to the curtailment required when the funds were reduced in 1934 and represent the minimum necessary. The increase will provide for five additional assistants in the Washington office.

(2) An increase of $19,992 for additional assistance in the identification and classification of insects. The identification of insect pests is the first step in determining methods of control or evaluating the importance of those which may be intercepted on products imported into the United States. The identification and classification of insects is, therefore, essential to all the activities concerned with the control or prevention of spread of injurious forms or the utilization of those that may

be beneficial. There are many hundreds of thousands of kinds of insects, many of which superficially resemble each other. The identity of the forms can be determined only by well-trained, competent entomologists specializing in the groups of related forms. The present force of such specialists is inadequate to give the service required and, as a consequence, there is a great delay in the identification of material submitted to them. This hampers many lines of investigation carried on by the Bureau and interferes with the proper and prompt disposition of valued importations. An essential feature of the identification work is a thoroughgoing study of the classification of related forms, investigations which can only rarely be conducted by the present force. The absence of such studies has led to erroneous conclusions regarding the application of control, as recently demonstrated in the case of the screw worm and one other pest of animals. The work incident to the identification and classification of insects is not spectacular and is far too often taken for granted. The recommended increase will only partly correct the delay in securing prompt and accurate identification of insect pests, but it will materially aid in correcting the present unsatisfactory conditions which have persisted to the detriment of the efforts towards pest control. The amount requested will provide for four additional specialists and four laboratory aids to prepare specimens for study.

CHANGE IN LANGUAGE

The language of this paragraph has been amended by the elimination of the words "the importation and exchange of useful insects." The activities carried on under this authority are to be transferred from this item to and made a part of the proposed new item "Foreign Parasites". The activities concerned with the importation and exchange of useful insects are closely related to others included under the proposed new item, and it is desirable that this specific authorization, which has long been included in appropriation acts, be transferred as indicated.

WORK UNDER THIS APPROPRIATION

General.--The work prosecuted under this item is essential to the various activities of the Bureau and involves identification of specimens and the recording and distribution of facts regarding the prevalence and abundance of economic insect pests. The activities are grouped under two projects, as follows:

1. Insect Pest Survey.--These activities are concerned with (a) the assembling, recording, analysis and maintenance of permanent records on insect abundance and damage; (b) the maintenance of records of the occurrence and distribution of insect pests in foreign countries--information necessary in connection with the enforcement of quarantines regulating the entry of plants and plant products; and (c) the publication of a monthly bulletin on current insect conditions and an annual summary of the conditions which occur throughout the United States.

Information on insect conditions throughout the country is supplied through cooperative arrangements with entomologists of the Bureau and State entomological agencies. These cooperators furnish notes on the occurrence

and relative abundance of insect pests in their respective regions. The assembling and redistribution of current information on insect conditions is of importance to the Bureau but is also useful to State workers in forewarning them of menacing insect conditions occurring in neighboring areas.

2. Identification and Classification of Insects.--This project is of a continuing and service nature of vital importance to economic entomology. It includes the identification, classification, and description of insects in both the adult and immature stages. Accurate and authoritative information on the identity and relationships of insects is required in the daily work concerned with research on insects, with control activities, and with the enforcement of plant and animal quarantines. Without this information it would be impossible to conduct many of these activities in an effective manner. The prompt recognition of the numerous insect pests is essential, and this can only be done by specialists. This activity plays an important part in the economic work on insect pests carried on by other governmental agencies, State agricultural colleges and experiment stations, universities, etc., in this country and elsewhere. The demand and need for accurate information regarding the identity of insects are increasing. During the past year material submitted for determination more than doubled over the increase of the previous year, which showed an increase of approximately 150 percent. In connection with these activities, investigations are also carried out on the anatomy and structure of insects. The proper understanding of the characters by which the hundreds of thousands of kinds may be distinguished is essential.

The generally accepted classifications used for insects group the class insects into 25 orders. The insects belonging to some few of these are not of major economic importance, or the number of species belonging to the group is comparatively few. Specialists employed under this project do not study the species belonging to these groups. There are a number of important orders, however, for which no specialist is employed under this project for special study of these groups. Specimens submitted for identification and belonging to these are handled in the best practical way, either by employed workers or by reference to collaborating specialists. The specialists now available devote their attention to the study and identification of specimens belonging to some 14 orders of insects. There are four specialists who study the order which includes beetles, weevils, etc., an order containing hundreds of thousands of forms, of which there are more than 9,000 species in the District of Columbia alone. Three specialists study the order which includes flies, containing thousands of species and such forms as fruit flies, mosquitoes, horse flies, many parasitic forms, etc. Four workers devote their attention to the order containing butterflies and moths, which embraces such economic forms as the codling moth, the Oriental fruit moth, and hundreds of thousands of other species. Two specialists study the order containing true bugs, leafhoppers, etc., of which there are many thousands of kinds, including such important pests as the sugar-beet leafhopper, potato flea hopper, cotton flea hopper, and tarnished plant bug. One specialist devotes his time to the identification of scale insects, a group containing more than 6,000 species including such well-known forms as the San José scale, the red scale of citrus, etc. One specialist studies aphids, a group containing thousands of species, many of which transmit plant diseases. Four specialists are engaged in the study

of the order Hymenoptera, which includes parasites, bees, wasps, and ants. One major group of the latter order, the Chalcid flies, contains some 70,000 described species, none of which are more than a quarter of an inch long and many of which are less than a sixteenth of an inch long. One specialist gives attention to grasshoppers and is responsible for the determination of the numerous forms belonging to this and a closely related order containing earwigs. Another specialist studies mites and other ectoparasites, which belong in a number of different closely related orders and attack all kinds of animal and plant life and include such forms as chicken lice, goat lice, human lice, the orange rust mite, various greenhouse mites, etc.

(v) FOREIGN PARASITES (a)

Appropriation Act, 1937.....	- - -
Allotment from "Fruit Insect Investigations" (collection and introduction into this country of natural enemies of Oriental fruit moth and of Japanese and Asiatic beetles).....	$7,900
Allotment from "Forest Insects" (collection and introduction into this country of natural enemies of introduced forest insects).....	4,500
Allotment from "Cereal and Forage Insects" (collection and introduction into this country of natural enemies of various insect pests of cereal and forage crops)..	7,900
Allotment from "Cotton Insects" (collection and introduction into this country of natural enemies of pink bollworm).....	2,700
Allotment from "Insect Pest Survey and Identification" (for exchange of useful and beneficial insects).....	5,000
Total available, 1937.....	28,000
Budget Estimate, 1938.....	38,000
Increase.....	10,000

(a) This is a new item in the Estimates for 1938 and provides for recurring expenses incident to the collection and importation of natural enemies of insect pests, work authorized and provided for under several items in the Agricultural Appropriation Act for 1937. The amounts used for recurring expenses under these items are shown as allotments in the above statement. The total of these is the amount available in 1937 for this work.

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Foreign Parasite Introduction..	$28,000(a)	$28,000	$38,000	+$10,000 (1)

(a) For 1936 includes allotments indicated for 1937 in the table at the top of this page.

INCREASE

(1) An increase of $10,000 for additional personnel to handle importations of insect parasites. Personnel is not now available to receive and hold under appropriate safeguards and quarantine requirements natural enemies for all kinds of insect pests. The specialists who have done this in the past have been assigned to such work incidental to their other activities such as the distribution of species being colonized in various parts of the country. It is necessary to handle all importations in a way to insure the absence of objectionable insects such as secondary parasites which prey on beneficial natural enemies. There is urgent need for a well-trained entomologist to receive and handle, in an appropriate manner, the importations of natural enemies of various insect pests before they are turned over to the field laboratories responsible for their distribution in the field. This specialist should be stationed at an appropriate place near the port where the largest number of importations are made. These operations are of a recurring nature, and a major part of the recommended increase will be used for this purpose.

The laboratory now maintained by the Bureau in Japan serves as a base for investigations and explorations incident to the collection and shipment of beneficial insects from the Orient. The opportunities for importation of parasites from this region are very great, but it is impossible for the one man now working there to handle the laboratory and field work effectively. An additional worker is needed to aid in the importation of natural enemies of introduced pests native to this region but studied under several appropriations. Some of these pests are the Oriental fruit moth, Japanese and Asiatic beetles, spruce sawfly, elm leaf beetle, corn borer, and the pink bollworm of cotton.

REASON FOR SEPARATE APPROPRIATION

The following language is proposed for this new item:

> Foreign parasites: For administrative expenses in connection with the introduction of natural enemies of injurious insects and related pests, and for the exchange with other countries of useful and beneficial insects and other arthropods, $38,000.

The advantage of using natural enemies to aid in controlling injurious and obnoxious insect pests has long been recognized and the location, collection, and introduction of parasites of various important introduced pests have for many years been a function of the Bureau, for which funds have been annually provided. Work in this field has thus become a definite part of the research on insect pests and is of increasing importance. The various activities dealing with the several pests have until recently been treated as separate units. Many of the operations and expenses incident to the collection and introduction of natural enemies are, however, of a recurring type. The work involved in activities of this nature is specialized, requiring specially trained personnel, contacts with officials in foreign countries, knowledge of methods of transportation and employment differing in many details from that commonly used in the performance of investigations carried out on the mainland of the United States. Experience has shown that

the best results are secured by maintaining headquarters and laboratory facilities at appropriate points in the field and by establishing uniform plans and procedure for handling imported material.

Recognizing the fundamental importance of the use of natural enemies to combat insect pests, and in the interest of efficiency of operation and direction, it is proposed to establish a separate appropriation item to provide for the recurring expenses incident to the authorized work of introducing beneficial insects. This will simplify the handling of these items of recurring expense and the administration and supervision of this work. It is proposed that part of the funds provided for the importation of natural enemies under various appropriations used primarily for recurring expenses be transferred (with corresponding reductions) to and made a part of this new item. The items and activities from which these transfers are proposed, and the amount to be transferred, are given in the following tabulation:

Appropriation	Activity	Amount
Fruit Insect Investigations:	Natural enemies of Oriental fruit moth. Natural enemies of Japanese and Asiatic beetles.	$7,900
Forest Insects:	Natural enemies of introduced forest insects	4,500
Cereal and Forage Insects;	Natural enemies of the European corn borer. Natural enemies of the alfalfa weevil. Natural enemies of various insect pests of cereal and forage crops	7,900
Cotton Insects:	Natural enemies of pink bollworm	2,700
Insect Pest Survey and Identification:	Exchange of useful and beneficial insects	5,000
Total amount to be transferred		28,000

This proposal contemplates that the direct expenses incident to the collection, transportation, and handling of natural enemies of the specific insects--all of which are largely of a temporary nature--remain under the item which specifically provides for work on the particular pest. Modifications of activities concerned with the importation of parasites of any particular pest would be presented and defended under the item providing for work on the pest in question rather than under the new item. The proposed item is principally concerned with recurring expenses and has much the same relation to the exploration for and introduction of natural enemies as the item "General Administrative Expenses" has to the activities of the entire Bureau.

By providing for and recognizing the principle of the importation of natural enemies which may aid in combating insect pests, it will be practicable to arrange for the introduction of natural enemies of many pests and treat this important phase of insect control in a broader way. The definite establishment of a technical unit of trained men headquartered in regions where work of this character can be carried out advantageously should be of material advantage and encourage the importation of natural enemies of many pests rather than direct attention to only a few.

WORK UNDER THIS APPROPRIATION

This item provides for the administration and coordination of activities concerned with the introduction of natural enemies of insects and related pests to aid in the control of injurious and noxious forms. It also provides for cooperation with other countries in exchanging useful and beneficial insects. The work includes (1) exploration to locate natural enemies of insects which may aid in controlling other insects or related animals injurious to man, his crops, belongings, resources, and livestock; (2) investigations on the various species to determine their relations to hosts, etc.; (3) collection and shipment to the United States of the useful natural enemies; (4) the receipt of introduced natural enemies under proper safeguards; (5) study of the introduced forms prior to release for colonization; and (6) coordination of activities concerned with the colonization of introduced parasites. It also includes activities concerned with the exchange with other countries of beneficial insects. The exploratory work now on this project is headquartered at a laboratory near Paris, France, and one at Yokohama, Japan. Many of the shipments now received are handled first in quarantine quarters at Moorestown, New Jersey.

(w) CONTROL INVESTIGATIONS

Appropriation Act, 1937.....	$62,518
Budget Estimate, 1938.....	70,000
Increase.....	7,482

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Control investigations.....	$59,076	$62,518	$70,000	+$7,482 (1)
Unobligated balance.....	3,442	- - -	- - -	- - -
Total appropriation.....	62,518	62,518	70,000	+ 7,482 (1)

INCREASE

(1) An increase of $7,482 for the development of equipment or apparatus to aid in enforcing plant quarantines, eradicate and control plant pests, disinfect plant products, determine toxicity of insecticides, and related phases of pest control. The development of new insecticides involves chemical studies

to make new materials and tests of these new materials to determine their toxicity on insects. The chemists are able to synthesize or otherwise produce far more materials than can, with the present force, be tested on insects. The need for developing new insecticides for combating insect pests is forcefully emphasized by the difficulties incident to the removal of residues from fruits or vegetables used as human food. The developmental work is being slowed down because of the inability to make the tests on insects as rapidly as the new materials may be developed. During the past year more than 300 organic compounds, synthesized by the chemists, have been tried out on test insects. Fifty, or about one-sixth of these, showed promise. Further tests on these materials are important. To conduct them, however, will prevent the testing of other materials being developed by the chemists. In developing new insecticidal materials it is essential that the entomological phases of the work be stepped up so as to at least balance that done by the chemists.

WORK UNDER THIS APPROPRIATION

This work deals with problems having an intimate relation to much of the research, control, and quarantine enforcement work of the Bureau. For the effective solution of these problems it is necessary to cut across crop and divisional lines, but the work in such cases is closely coordinated with that done by other units. Certain activities are concerned with the commercial application of methods developed for the sterilization or disinfection of plants or plant products. It provides for the coordination and standardization of methods of disinfection required by various plant quarantines. It also provides for technical studies to discover or develop insecticides and to obtain new and needed information on the action of insecticides, repellents, and attractants. An important phase of the work is the testing of new materials that may be developed as the result of chemical studies to determine their toxicity under laboratory conditions on certain standard test insects and plants. This testing of materials on insects goes hand in hand with investigations on the chemistry of insecticides. These technical studies form the basis for suggestions for new materials or methods that may be useful against particular crop pests. Those which promise to be of value are given further testing at field laboratories concerned with the control of insects for which they may be applicable. The basic information secured is applicable to many other lines of work on insect control.

Investigations to determine the application, under varying conditions, of gaseous insecticides in the destruction of insects of economic importance are concerned primarily with methods of commercially applying fumigants for the treatment of products covered by quarantine regulations. A problem worked out during the past season was the dosage and fumigant which could be used in fumigating vetch seed to prevent the spread of the vetch bruchid and the treatment of products that are moving interstate and are accompanied by infestations of insects which may not be subject to quarantine.

Certain insect pests which may occur in many of the products regulated by quarantine can be killed by the use of heat or cold, and this method of sterilizing plants or plant products is used in connection with certain Federal quarantines. The commercial application of these methods requires constant technical supervision and standardization. An important part of

this work consists of furnishing this type of service to the unit responsible for the enforcement of the quarantine, an example of which is the treatment at designated storages of grapes imported from Spain. Certain pests not regulated by quarantine may be combated by the use of heat and cold. Some experiments to determine the effect of heat or cold on insects, and especially those forms that may be moved in connection with commercial shipments, are carried on in cooperation with other divisions of the Bureau. One problem of this nature recently completed dealt with the effect of low temperatures on insect enemies of stored tobacco.

With the development of new insecticides there is need to determine effective ways of applying new materials. Studies on the development of machinery or equipment used in applying insecticides are a part of the activities which come under this project. At present most of the attention is being devoted to the modifying of machinery in applying insecticides used in control operations against certain major pests such as the gypsy moth. An effort is being made to develop a new type of pump which will overcome some of the difficulties incident to forcing spray materials through long lines of hose in operations for the control of the gypsy moth. Studies are also being carried on in cooperation with other divisions of the Bureau to perfect and develop methods for applying insecticides from the air.

The important part of the work under this project consists of testing new materials to determine their effect on insects. New materials developed by the chemists are tested under laboratory conditions on various types of insects and plants to make a preliminary determination of the effect of new compounds on the insects on plants. The materials tested include not only those synthesized by the chemists but also the extracts of various plants thought to contain properties of insecticidal value. Two kinds of insects, which can be made available in large quantities throughout the year and are particularly susceptible to poisons, are used in these tests. These are mosquito larvae and the southern army worm. In addition to testing material developed by the chemists, these laboratory tests are intimately associated with the activities concerned with the development of strains or varieties of plants which contain insecticidal properties. The breeding work of the Bureau of Plant Industry to develop strains or varieties of the native plant known as devils' shoestring (*Cracca virginiana*) to increase the amount of active insecticidal properties must be correlated with tests on insects to determine the toxicity of these materials. Headquarters for these operations are at the National Research Center at Beltsville, Maryland, and at a laboratory in Orlando, Florida.

A thorough knowledge of the normal physiology of insects is a necessary basis for studies to determine the effect that various kinds of poisons may have on the insect. Physiological studies and investigations on insects are a part of the activities carried on under the project and involve studies to determine the relation of insects to external and internal environmental factors. These serve as a basis for determining the lethal action under abnormal conditions such as temperatures, poisons, etc.

Studies to determine the toxic effect of insecticides on insects include a group of related problems considered under this project. The object of studies of this nature is to determine the effect on insects of various compounds and to ascertain the lethal dosage of insecticides under varying conditions of temperature and humidity. One of the activities now receiving attention is a cooperative study with the chemists on several varieties of

calcium arsenates. These studies suggest that there is a correlation between the various chemical forms and their toxicity. This may lead to a standardization of this insecticide, which is used in large quantities and recommended for the control of a wide variety of insect pests.

Tobacco has long been recognized as one of the standard insecticides. Studies are now under way to determine the possibility of using various forms of insecticides made from tobacco as stomach poisons as well as contact poisons. These activities are carried on in cooperation with the chemists and include not only studies on tobacco extracts themselves but also on the possibility of mixing them in a more effective manner with other materials which would serve as carriers.

(x) INSECTICIDE AND FUNGICIDE INVESTIGATIONS

Appropriation Act, 1937	$148,984
Budget Estimate, 1938	148,984

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Chemical investigations on insecticides	$148,220	$148,984	$148,984
Unobligated balance	764	- - -	- - -
Total appropriation	148,984(a)	148,984	148,984

(a) For 1936 excludes $20,000 allotted to "Agricultural Chemical Investigations", Bureau of Chemistry and Soils for studies of pharmacological effects of insecticides.

WORK UNDER THIS APPROPRIATION

These investigations are designed to develop better and cheaper materials for destroying or repelling injurious insects and fungi. Particular attention is directed to those which are less hazardous to users and less poisonous to anyone eating sprayed or dusted fruits and vegetables. The improvement of existing insecticides and fungicides by the detailed study of their physical and chemical properties is also under way. Investigations are conducted to originate and improve methods of analyzing and to devise cheaper methods of manufacturing these products. The determination of the most effective chemical means of removing harmful spray residues from fruits and vegetables which have been treated with compounds containing arsenic, lead, copper, fluorine, or other insecticidal and fungicidal materials is also an important phase of the work.

Some of the most useful insecticides--for example, pyrethrum, nicotine, derris, and cube--are natural products of plant life. It is believed that there are many other plants which have insecticidal properties of value. This work seeks to discover such plants, study the constituents to which the toxicity is due, develop useful insecticidal preparations, and improve insecticides derived from plants containing insecticidal properties of known merit. Special attention is being given to derris, cube, and pyrethrum. An effort is being made to determine ways of preventing the decomposition of effective insecticidal properties of extracts of derris and cube and studies are made of the relationship of the active insecticidal principles of these plants, such as rotenone and deguelin. A study is being made of certain native plants to determine those which contain considerable quantities of rotenone and other active ingredients. This study is directed particularly to the so-called devil's shoestring and is correlated with biological tests. Detailed studies on the chemical structure of pyrethrum indicate that it is simpler than previously believed, suggesting the possibility of producing this important insecticide synthetically.

Investigations are being made to develop organic compounds which have insecticidal properties but leave residues relatively non-injurious to warm-blooded animals or man. Hundreds of organic compounds have been obtained or synthesized. One promising material which has recently been developed is now being tested in the field. Special attention is being given to the synthesis of organic compounds containing sulphur and to methods of using phenothiasine or derivatives that may be prepared from it.

Investigations of various chemical problems connected with the removal of spray residues are closely coordinated with investigations carried on in other units of the Bureau and in the Bureau of Plant Industry. An effort is being made to develop chemical methods for removing objectionable residues. Analyses are made to determine the amounts of residues resulting from various spray formulae. The work includes studies on apples and other fruits, such as peaches, grapes, berries, and certain vegetables such as cabbage. In addition to determining the residues which result from the use of insecticides such as the arsenicals, attention is also being given to the determination of methods for determining residues from organic compounds such as derris.

Studies on inorganic insecticides are directed to the improvement of common inorganic insecticides and the development of possible new combinations which have desirable characteristics. By far the larger part of insecticides used belong to the inorganic group. Many of these are effective against the insect but are more or less injurious to the foliage. The reaction of these materials is variable, and their insecticidal properties may be improved and modifications made in their manufacture. Other materials may be developed by improving their physical properties. Calcium arsenate is being intensively studied to determine basic facts regarding it. Six special forms of calcium arsenate have been prepared for testing to determine the correlation that exists between the chemical constituents and the toxic properties.

Chemical investigations on fumigants aim to develop new methods of using well-known chemical compounds for the fumigation of growing material or stored products to increase their efficiency and reduce the cost of operations. Chemical investigations on fumigants also aim to find new

compounds which may be used as fumigants and to determine the correlation between their chemical constituents and their toxicity to various insect pests. These activities are closely correlated with those of other units in the Bureau. Special attention is being given to fumigants for use in mills and milling machinery, the use of fumigants in mushroom houses, and fumigants that may be effectively used for the control of the resistant form of the California red scale of citrus.

Oils and oil emulsions constitute a very important class of insecticides, and investigations are under way to establish the relationship between insecticidal efficiency and the chemical and physical properties of oils or emulsions made from them. Studies are made to determine the relation between the size of the oil droplet and its effectiveness in covering foliage or other materials to which it is applied. Studies are being made on adding other insecticidal compounds to the oils so that they will remain in an oil phase of an emulsion. Interesting information has been secured, and it is believed that this field will develop materials which should have greater insecticidal and ovicidal action.

The application of insecticides requires the use of substances which act primarily as carriers. Studies are made to determine the composition, characteristics, and uses of a large class of materials which in themselves have no insecticidal properties but are used in conjunction with insecticides to improve their application. Materials of this class include those added to improve the distribution of insecticidal dust and those used to increase the wetting, spreading, penetrating, and adhesive properties of sprays. As a part of this activity a study is being made of stabilizers to protect various materials from the effect that weather conditions may have on their toxicity. A wide variety of products is studied in connection with these activities.

Goldfish respond to many poisons in a manner similar to many insects. They can be maintained throughout the year in the laboratory and are readily available as test animals. By using them in initial tests, studies to develop new plant materials and organic compounds which may be used as insecticides are expedited. Goldfish are now used largely to secure information on the question of the correlation between toxicity and the chemical composition of certain compounds such as phenol and its derivatives, with particular emphasis on the derivatives of thiophenol.

In carrying on both the investigational and control activities of the Bureau there is need to have many materials analyzed so that their constituents will be known. The chemical activities of this type are primarily of a service nature but include the analysis of samples of miscellaneous insecticidal materials to determine whether they meet specifications and the determination of the constituents of materials tested by various laboratories of the Bureau and hence usually have a definite bearing on research.

(y) TRANSIT INSPECTION

Appropriation Act 1937.....	$29,059
Budget Estimate, 1938.....	44,059
Increase.....	15,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
Transit inspection.....	$28,936	$29,059	$44,059	+$15,000 (1)
Unobligated balance.....	123	- - -	- - -	- - -
Total appropriation....	29,059	29,059	44,059	+ 15,000 (1)

INCREASE

(1) An increase of $15,000 to strengthen the transit inspection service. Large quantities of articles regulated by Federal quarantines are continuously moving by mail, express, and freight through important transportation centers from that part of the Northeastern section of the country where there are infestations of important introduced plant pests. The period of shipping many regulated articles, such as nursery stock, has increased greatly. Under the present appropriation it is impossible to maintain full-time inspectors at such strategic centers of distribution as Philadelphia, Pittsburgh, Dallas, St. Louis, Kansas City, Memphis, and Washington, D. C., and hence these main channels of rail movement are unguarded during a considerable portion of the year. The importance of having transit inspectors on duty at these points throughout the year is emphasized by the interception at Pittsburgh, during six weeks of a dull period, of 109 lots of materials moving in violation of Federal quarantines. Similar conditions undoubtedly exist at other transportation centers which are unguarded.

With the movement of articles through unguarded transportation centers in violation of Federal quarantines, protection to the agricultural areas of the Mid-West, South, and Southwest that regular inspection would afford is lacking. It is not unlikely that the infestation of the Japanese beetle recently discovered at St. Louis may be attributed to the inadequate enforcement of quarantine on commerce lines radiating from the infested quarantined area.

The inspection of regulated articles in transit involves work of a service to all quarantine activities of the Bureau. While inspectors from some units may be, and are, stationed at important centers during temporary busy seasons, it is necessary to have a trained unit to direct the work. The proposed increase would provide for trained men at the seven important centers listed above throughout the year.

WORK UNDER THIS APPROPRIATION

The only means by which the Department can be assured that safeguards required under quarantine regulations are being followed in the case of mail, express, and freight shipments is to maintain a system of inspecting these products while in transit. This work consists of checking such shipments at important railway centers and transfer points. The prompt discovery of any weakness in inspection or certification makes it possible to correct faults or add necessary safeguards for the prevention of the establishment of pests at points far removed from the infested area. Experience has shown that, when the Department fails to check shipments at railroad centers and transfer points, uninspected, untreated, or uncertified products, which may be infested, are transported by common carriers into uninfested areas and thus threaten the establishment of these pests in such areas. The transit inspection service not only turns back several thousand packages every year but it also serves to keep the employees of common carriers informed of quarantine requirements and thus obtains their active support in cooperating with the Department in its enforcement of Federal quarantines.

(z) FOREIGN PLANT QUARANTINES

Appropriation Act 1937.....	$625,956
Budget Estimate 1938.....	697,500
Increase.....	71,544

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Increase
1. Import and permit service for issuance of permits for the importation of plants and plant products to comply with plant quarantines.....	$58,163	$58,348	$63,348	+$5,000 (1)
2. Inspection at ports of entry of plants and plant products regulated by plant quarantines.....	565,959	567,608	634,152	+66,544 (2)
Unobligated balance.....	1,834	- - -	- - -	- - -
Total appropriation.....	625,956	625,956	697,500	+71,544

INCREASES

The increase of $71,544 in this item for 1938 consists of:

(1) An increase of $5,000 for investigations to determine methods of treatment of imported plants because of the presence of insects or plant diseases. Data are needed to augment that now available on the subject of treatments to be given to imported plants found to be infested or infected with injurious insects or plant diseases. This involves the development of treatments which will not only be effective against the pest concerned but at the same time will not impair the health and vigor of the plants so treated.

(2) An increase of $66,544 for strengthening the plant-inspection work at maritime ports, at Mexican border points, and in Hawaii, as follows:

(a) $23,030 for inspection at maritime ports. There has been a marked increase in importations of plants and plant products covered by Federal quarantines and in the number of passengers who are passing through the various maritime ports and who carry in their baggage articles subject to inspection by plant-quarantine inspectors. The importation of Spanish grapes, which is permitted subject to treatment at certain designated ports, has likewise substantially increased the work. The increase requested will provide men to meet these requirements and will replace eight quarantine inspectors dropped on July 1, 1934 on account of reductions in appropriations. In one instance the employment of a clerk will release practically the entire time of one inspector, who will thus become available for more important work. The employment of the necessary clerical help is included in this estimate. It has been difficult in the past to provide for relief during annual leave or sickness at those maritime ports where one inspector only is employed, and it is expected that this increase will assist in meeting this situation. It is also desirable that the Washington office be kept in closer contact with the work at these ports, and a portion of this increase will help to provide more supervision.

There is a difficulty encountered at the maritime ports in connection with the disinfestation of small lots of plant material offered for entry or brought in by passengers. Where fumigation is required of these plants and plant products there is lack of facilities to handle such work in small quantities. It will be a great accommodation to the public and will facilitate the orderly conduct of the work if small fumigating plants could be made available at these ports, and this estimate includes the provision of at least eight such fumigators for use at eight of the ports where the need is the greatest.

(b) $40,914 for inspection at Mexican border ports. This increase is needed to permit expansion of the inspection and fumigation facilities along the Mexican border to keep pace with the growth in traffic at the various ports of entry. Freight cars which cross the border from this country into Mexico are a potential menace on their return on account of the possibility that they may have become contaminated with cottonseed or cotton products and that thereby the pink bollworm may be brought into the United States. These cars are examined at the border and many of them are placed in fumigation houses and fumigated as a precautionary measure.

The houses have been built for this work at most of the railway crossings into the United States, and the increase in business has been such as to make the purchase of fumigating materials a serious problem. Prior to the depression as high as 18,000 cars were fumigated in a single year. In 1933 this number had decreased to 3,090. In 1934 it had increased to 5,408, and in 1935 it had reached 6,841. It is estimated that 8,000 will be fumigated in 1936. At this rate of increase it is anticipated that no less than 10,000 cars will require fumigation in 1938. There is a charge made against the railroads of $4 per car for this fumigation, the proceeds being covered into the Treasury. In 1936, on the basis of 8,000 cars estimated for fumigation, the returns to the Government will be $32,000. Present funds available for the operation of the foreign-plant quarantine work will not permit the continued increased output for fumigation materials, which it is indicated will be needed for 1938, and a large part of the additional amount requested will be needed to cover the increased purchases of fumigants.

By making use of emergency funds the car fumigation houses along the border were completely renovated and improved in the fiscal years 1934 and 1935, and no repairs have been needed on these houses since. It is believed that it is economical and in the best interest of the Government to protect the investment in these houses by maintaining them in their present excellent condition. A part of the increase requested is designed to be used to institute a regular maintenance and upkeep program. The additional funds will also provide for increased supervision of the work along the Mexican border, closer contact between the administrative offices and field offices, the employment of two additional inspectors to replace two inspectors who were dropped on July 1, 1934 on account of reduced appropriations, and relief during periods of annual leave and sickness for one-man ports without interfering with work at other ports.

(c) $2,600 for inspection in the Hawaiian Islands. The work in Hawaii is primarily connected with the precautions necessary to protect the mainland from the Mediterranean fruit fly, which is prevalent in the Hawaiian Islands. Fruits and vegetables produced there and which are most likely to carry the fly are prohibited entry to the mainland; but there are certain fruits and vegetables which can be produced and harvested under proper precautions, the entry of which is considered comparatively safe but which require supervision to see that the restrictions are complied with. There is a growing tendency in the Islands to go into the production of these crops because of curtailment for economic reasons in the production of sugarcane and other crops which have been the principal products of the Islands. To meet this growing demand for inspection and certification for Hawaiian-grown products, it is necessary to station one additional inspector at Honolulu to supplement the force there.

WORK UNDER THIS APPROPRIATION

General.--This subappropriation provides for the continuance and maintenance of activities to prevent the entry into the United States of injurious insects and plant diseases by controlling and safeguarding the entry of plants and plant products. It involves the enforcement of (1) foreign plant quarantines and regulatory orders issued under the Plant Quarantine Act of 1912, as amended; (2) rules and regulations governing the entry into the United States of railway cars and other vehicles, etc., from Mexico; (3) the Act of 1905 governing the importation of living insects

into the United States; and (4) regulations governing the shipment of plants and plant products to the mainland from Hawaii and Puerto Rico.

The activities are grouped into two main headings. One of these provides for authorizing the importation of plants or plant products which may enter the United States under the quarantines and regulatory orders. The other is concerned with inspections at ports of entry to detect and exclude dangerous plant pests and to see that plant material imported under permit meets the requirements of the authorization.

1. Import and Permit Service for Issuance of Permits for the Importation of Plants and Plant Products to Comply with Plant Quarantines.--These activities are concerned with the issuance of permits authorizing the entry of plants and plant products which can be imported without introducing dangerous plant pests. It is necessary to limit the entry of plants and plant products to those which represent the least pest risk or to those which may be adequately safeguarded. Plants and plant products imported into this country from abroad come under permit which gives a record of volume, nature of contents, and destination and point of origin. Material accompanied by permits issued in advance is later inspected to determine that the requirements have been fulfilled. These inspections and, if necessary, disinfection or rejection, take place usually at the port of entry, except in the case of nursery stock which is inspected at certain designated points where facilities exist for the care of living plants during their inspection. The issuance of permits requires a large amount of correspondence and the making and maintenance of records. The work is done for the greater part in Washington.

2. Inspection at Ports of Entry of Plants and Plant Products Regulated by Plant Quarantines.--This project has for its purpose the protection of the United States against the entry of injurious insects and plant diseases. It includes work at the maritime ports of entry and the principal Mexican border ports of entry. It also includes the District of Columbia inspection service, which provides for examination and treatment, if necessary because of the pest risk involved, in order that domestic plant material entering or leaving the District may be inspected and certified to meet the requirements of States to which it is consigned and to provide inspection and certification for plant material imported and distributed by the United States Department of Agriculture. This work also includes the inspection and certification for movement to the mainland of plants and plant products permitted from the Territory of Hawaii, and also for the protection of Puerto Rico against the entry from foreign countries of injurious insects and plant diseases and to prevent the movement to the mainland of injurious insects and plant diseases known to occur in Puerto Rico. This work includes (1) the inspection of ships, passengers' baggage, ships' stores, and the belongings of travelers entering this country at border ports of entry from Mexico; (2) the inspection of materials entered under permits; and (3) the inspection of certain classes of plants in the field following initial inspections at ports to assure absence of disease or pests which can not be detected by one inspection.

(aa) CERTIFICATION OF EXPORTS

Appropriation Act, 1937.....	$31,862
Budget Estimate, 1938.....	31,862

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)
Certification of exports.....	$31,634	$31,862	$31,862
Unobligated balance.....	228	- - -	- - -
Total appropriation.....	31,862	31,862	31,862

WORK UNDER THIS APPROPRIATION

This item provides for a service to American exporters and consists of inspection and certification of fruit or other plant products to meet the sanitary requirements of the countries to which it is intended the products will be shipped. The inspection made is that necessary to issue the certificate required by the country of destination as a condition of entry. The work is carried on at various ports from whichthe products may be shipped. A nominal fee is charged for the work, but it is insufficient to make the project self-supporting.

The amount of material offered for inspection and certification so that it can be exported has materially increased in recent years. During the fiscal year 1935 fifty-eight kinds of commodities were certified for shipment to 58 countries, requiring 6,907 certificates for 2,792,029 containers. For the fiscal year 1936 fifty-nine kinds of commodities were certified for shipment to 65 countries, requiring 9,099 certificates for 3,740,495 containers. Ninety-one foreign countries now are requiring inspection and certification with respect to the presence of insects and plant diseases on fruit or other plant products exported from the United States. The American exporter is required to furnish a certificate indicating freedom from dangerous insect pests and plant diseases. It is evident that, if American growers are to maintain their markets in foreign countries having these requirements, all shipments will have to be carefully inspected.

(bb) SCREW-WORM CONTROL

Appropriation Act, 1937.....	$460,000
Budget Estimate, 1938.....	- - -
Decrease.....	460,000

PROJECT STATEMENT

Projects	1936	1937 (Estimated)	1938 (Estimated)	Decrease
1. Screw-worm educational and control operations	$416,329	$409,300	- - -	-$409,300(1)
2. Control measures for screw worms.....	53,125	25,700	- - -	- 25,700(2)
Unobligated balance.....	10,546	25,000	- - -	- 25,000
Total appropriation....	480,000(a)	460,000(b)	- - -	- 460,000

(a) Excludes $15,000 of 1937 appropriation obligated in 1936, and includes $60,000 of 1936 appropriation obligated in 1935.

(b) Includes $15,000 of 1937 appropriation obligated in 1936.

DECREASE

The estimates for 1938 do not provide for the continuation of the cooperative control campaign on screw worms, and the special language authorizing this work is eliminated. It is expected that, during the present fiscal year, the information now available on control methods will be brought to the attention of stockmen and others throughout the range of this pest. Of the funds appropriated under this item, $27,500 was allotted for investigations. The 1938 estimates provide that $22,452 be appropriated as an increase to the item "Insects Affecting Man and Animals" so that the investigations conducted on this pest with these special funds may be continued.

WORK UNDER THIS APPROPRIATION

The Agricultural Appropriation Act for the fiscal year 1937 made $460,000 immediately available for determining and applying methods for the control of screw worms, including research, educational, and demonstrational activities. The work carried on under this appropriation was divided into two main groupings: (1) cooperative educational and demonstrational campaigns to educate stockmen and others on methods of combating screw worms; and (2) investigations to determine facts concerning the screw worm to develop better methods for control. Most of the funds were allocated to the first activity, and $27,500 was used for investigations.

The educational campaign has been carried on throughout the area where the screw worm is known to occur and also in the Northern States where isolated infestations may occur as the result of shipment of cattle from the infested area. The work in the Southeastern States was a continuation along much the same lines as that carried on during the previous year but on a reduced scale.

Throughout its range the screw worm has been materially less abundant than it was in thepreceding year. Concerted effort to combat it has undoubtedly materially contributed to this reduction. Stockmen and others have had an opportunity to become familiar with recommended measures for control. It is not considered necessary to continue this special educational work beyond the present year. Information regarding screw-worm control, however, will be distributed by county agents and through other regular channels.

(cc) GRASSHOPPER CONTROL

Act of June 24, 1936 (Pub. Res. 127, 74th Congress)	$250,000
Budget Estimate, 1938	- - -
Decrease	250,000

This fund has been used as follows:

Obligated for grasshopper control in 1936	$225,800
Obligated for grasshopper control in 1937	16,200
Unobligated balance	8,000
Total appropriation	250,000

On June 25, 1936 a joint resolution was passed by Congress providing an immediately available appropriation of $250,000 for grasshopper control. The funds have been used to cooperate with States in the manner of previous cooperative campaigns to control grasshoppers. Grasshoppers emerged unusually early and at the time funds were appropriated had moved into the fields in many areas. The amount appropriated was not adequate to meet the demands or need for control. Provision had not been made in certain States for the local organizations and educational work needed to use the bait materials in the most effective manner. The bait materials secured with these funds were distributed to State agencies as nearly as practicable on the basis of the then existing needs and ability to effectively use the materials. The distribution of this bait by the State and local agencies enabled farmers in certain areas to save crops which otherwise would have been destroyed. Cooperating State agencies have estimated that the value of the crops thus saved was approximately sixteen million dollars. Since the material was applied late in the season and because of the unusual weather conditions, grasshoppers migrated into many sections, and the operations had but little effect in reducing the number of eggs laid and hence did not contribute materially to the control of the grasshopper outbreak.

EMERGENCY FUNDS
(Complete Bureau Statement)

(1) Direct Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Public Works allotments (National Industrial Recovery Act):		
White-pine blister rust control	$7,485	- - -
Barberry eradication	12,911	- - -
Physical improvements	474	- - -
Total, Public Works Allotments	20,870	- - -
Emergency Relief Appropriation Act, 1935:		
Citrus-canker eradication	132,742	$12,758
Control of phony peach disease	688,557	48,943
Control and prevention of spread of brown-tail moth	610,720	76,530
Control and prevention of spread of gypsy moth	2,394,300	263,950
White-pine blister rust control	3,539,985	867,819
Dutch elm disease eradication	2,651,888	194,949
Construction of storage shed at Chadbourn, N. C.	548	- - -
European corn-borer survey	83,683	- - -
Barberry eradication	1,489,741	360,759
Construction of portable insectaries at Tallulah, La.	1,813	187
Construction of field insectaries at Presidio, Texas	3,944	956
Construction of field insectaries at College Station, Texas	1,948	52
Eradication of wild cotton	59,806	7,194
Locating and destroying Thurberia plants	125,172	42,302
Control of peach mosaic	35,442	22,478
General administrative expenses	28,221	6,779
Total, Emergency Relief Appropriation Act, 1935	11,848,510	1,905,656
Emergency Relief Appropriation Act, 1936:		
Control and prevention of spread of brown-tail moth	- - -	266,000
Control and prevention of spread of gypsy moth	- - -	1,100,000
Barberry eradication	- - -	925,000
Phony peach disease control	- - -	293,333
White-pine blister rust control	- - -	2,500,000

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Relief Appropriation Act, 1936 - Continued:		
Eradication of Dutch elm disease.....	- - -	$2,732,000
Locating and destroying Thurberia plants...	- - -	52,000
Citrus canker eradication.....	- - -	145,500
Peach mosaic control.....	- - -	80,000
General administrative expenses.....	- - -	30,000
Total, Emergency Relief Appropriation Act, 1936.....	- - -	8,123,833
Hawaii and Puerto Rico Trust Funds, Sugar Processing Taxes (authorized by sec. 15(f), Agricultural Adjustment Act, as amended):		
Developing methods for control of fruit flies in Hawaii.....	$13,283	- - -
Insect pest survey in Puerto Rico.....	40,637	- - -
Total, Hawaii and Puerto Rico Trust Funds	53,920	- - -
Agricultural Adjustment Administration (Payments for Agricultural Adjustment):		
Fruit-fly control in Hawaii.....	42,217	24,500
Insect pest survey in Puerto Rico.....	39,286	13,077
Total, Agricultural Adjustment Administration Funds.....	81,503	37,577
Total, Emergency Funds (Direct Allotments)	12,004,803	10,067,066

(2) Indirect Allotments

Projects	Obligated, 1936	Estimated obligations, 1937
Emergency Conservation Work (authorized by Act of March 31, 1933; financed through War Department): Control of insect enemies of forests..	$54,795	$33,000

A decrease from $40,805 to $35,125 is submitted in the passenger-carrying vehicles authorization for 1938. It is estimated that this amount will provide for the purchase of 61 cars, all but one of which are replacements. These cars are for the use of field employees of the Bureau in various parts of the United States, as indicated in the data given in the Budget schedules.

With the exception of certain cars which have been operated over exceedingly rough country or for very extensive distances, none of the cars to be replaced is of a model more recent than 1933, and a number of them date back to 1929 and 1930. These machines have been operated under practically all conditions of use, ranging from city streets to extremely rough forest trails. They averaged as of August 1, 1936 more than 40,000 miles, and considerably more mileage will be added before they are actually turned in. In the experience of the Bureau, cars will not operate efficiently or economically beyond this mileage, and it appears to be distinctly in the best interests of the work to turn them in during the fiscal year 1938, as herein provided.

The one additional machine needed is a station wagon for the transportation of workers and materials engaged on forest-insect work in the vicinity of Asheville, North Carolina, where a considerable expansion of work is planned under an increase included in the Budget estimates for 1938 under the item "Forest Insects."

BOUND BY
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